GEOLOGICAL AND NATURAL HISTORY SURVEY OF CANADA.
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THE MINERAL WEALTH OF BRITISH COLUMBIA.

WITH AN ANNOTATED LIST OF LOCALITIES OF MINERALS OF ECONOMIC VALUE.

BY

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PUBLISHED BY AUTHORITY OF PARLIAMENT.

MONTREAL:
DAWSON BROTHERS.
1889.

Dr. Alfred R. C. Selwyn, C.M.G., LL.D., F.R.S.
Director of the Geological and Natural History Survey of Canada.

Sir,—In 1877, I prepared, in connexion with the Government Surys for the Canadian Pacific Railway, a general note on the Mines, ad Minerals of Economic Value of British Columbia, which was pubhed in the Railway Survey Report for that year, and was afterwards rinted, with some additions, in the Report of Progress of the Geogical Survey for 1877-78. Since that time great changes have occrred in respect to the aspects of mining in British Columbia, and iportant additions have been made to our knowledge of its mineral sources and geology. In view of these, and the increasing interest w manifested in the development of the natural resources of the ovince and the numerous enquiries constantly received on that subt, it appeared to be desirable to place the available information specting its mineral wealth in the hands of the public in a summared form. With this object in view I began the revision of the pubation first referred to, but soon found that in order to obtain a asonably satisfactory result, it would be necessary practically to rerite the whole. The work has, in consequence, assumed proportions rger than were at first contemplated. I have had an opportunity of rsonally examining most of the important localities here described. her places have been examined by yourself, by the late Mr. James chardson and by Mr. Amos Bowman. For a few which have not en visited by any member of the staff of the Survey, information s been drawn from other trustworthy sources.

I have the honor to be, Sir,

Your obedient servant,

GEORGE M. DAWSON.

Ottawa, *March* 1, 1889.

NOTE.—The ton referred to throughout this report is the ton of 200 lbs., unless otherwise stated.

THE

MINERAL WEALTH

OF

BRITISH COLUMBIA.

By GEORGE M. DAWSON, D.S., F.G.S.

Object and plan of report.

The object of this publication is two fold. It is, in the first place, intended to serve, in some measure, as an exponent of the mineral wealth of the Province to which it refers, to provide an answer of general kind to the enquiries now so frequently made on this subject, and to collect for this purpose in a convenient form brief summaries of the facts contained in the several official reports on the geological features of the Province, with specific references to the pages in which they are treated of at greater length. In the second place, it is designed to place in the hands of the 'prospector' or miner a convenient synopsis of facts, with a list of localities likely to be of interest to him. In the endeavour to carry out this second purpose, it has been considered advisable to add notes on such general principles, and to advance such suggestions, as from my study of the geological features of the Province, (dating from 1874) appear to be of importance, and likely to be of service at the present time in guiding the search for or exploitation of its metalliferous deposits. In further pursuance of this object, some facts resulting from late practice and investigations in other mining regions are alluded to, and their application to the problems of development in British Columbia is briefly noted.

The treatment of the various subjects included in this publication is necessarily more or less unequal, and no one can be more fully alive than the writer to its incompleteness in many respects. While the important developments now in progress in the Province appear to call for the present publication, it is to be anticipated, that within a short time anything that can now be said regarding vein-mining will be relegated to a position of merely historical interest.

Acknowledgements.

In connexion with the preparation of these notes, I have had occasion to apply to several gentlemen for information, which has been

readily and cordially supplied. I am under obligations particularly Messrs. G. M. Sproat and A. W. Vowell, Gold Commissioners for K tanie District; to Mr. G. B. Wright, and for some special notes to M R. D. Atkin, J. W. McKay, J. F. Allison, S. Robins and Hon. Dunsmuir. Much assistance has also been received from Mr. Am Bowman, and in the matter of assays and analyses from Mr. G. Hoffmann.

General Physical Features.

Area and position of British Columbia.

The Province of British Columbia, with an area of 390,344 squa miles, includes a length of over 800 miles of the Cordillera belt of t West Coast, a region of mountains and of geological disturbance, whi in this part of its extent has, between the Pacific Ocean and t elevated western margin of the Great Plains, a breadth averagi about 400 miles. This great mountain region extends north-westwa and south-eastward, and constitutes the effective cause which has pr duced the similar trend of the Pacific coast between the same par lels of latitude. It represents the northern continuation of the mo important metalliferous area of the United States, essentially repe ing its main orogrophic features, though presenting also some notab differences of a general kind as well as many local peculiarities.

The Cordillera belt.

The Cordillera belt, in British Columbia, may be described as co prising four great mountain systems or principal axes of uplift a geological disturbance, which are, in the main, nearly parallel to ea other and to the coast,—the Rocky, the Gold, the Coast and the Va couver ranges.

The Rocky Mountains.

The Rocky Mountain Range proper, is the furthest inland, and h an average breadth, in its southern part, of about sixty miles, but decreased near the Peace River to forty miles or less, and apparent loses its importance and regularity locally where cut through by t Liard, though recovering both still further to the north-westwar Near the 49th parallel, several summits occur in this range whi exceed 10,000 feet in height, but northward, few attain this elev tion till the head-waters of the Bow River are reached. Abo the sources of the North Saskatchewan and Athabasca, the rang appears to culminate, and Mounts Brown and Murchison occu with reputed heights of 16,000 to 13,500 feet respectively. Near t Peace, few summits exceed 6000 feet, so far as known. Though mo or less extensive snow-fields occur in many places, true glaciers a found only about the heads of the Bow, North Saskatchewan a Athabasca. Some of the valleys penetrating this range on the eas

are lightly timbered or in part prairie-like in character, but, as a rule, the mountains are thickly wooded wherever sufficient soil exists for the support of trees, and owing to the greater rain-fall on the western slopes of the range, the forests are there often very dense.

Rocks of the Rocky Mountains.

Crystalline schists and granite, are scarcely known in any part of the Rocky Mountains between the 49th and 60th parallels, the ranges being built up chiefly of a great series of Palæozoic rocks, extending from the Cambrian to the Carboniferous, with a total thickness of more than 28,000 feet in the Bow River region. There are also, however, more or less isolated basins of rocks of Cretaceous age, which rocks were evidently at one time continuous with those of the same age in the eastern foot-hills and Great Plains. In these basins, beds of bituminous coal and of anthracite are found. Deposits of copper-ores and of galena are so far the most important metalliferous minerals discovered in association with the older rocks of this mountain system.

Valley to south west of Rocky Mountains.

The south-western side of the Rocky Mountain Range, is defined by a very remarkable, straight and wide valley, which can be traced uninterruptedly from the 49th parallel to the head-waters of the Peace,—a distance of 700 miles or more. This valley is occupied by the upper portions of several of the largest rivers, including the Kootanie, Columbia, Fraser, Parsnip and Finlay. Gold-placers have been found and worked at a number of points along this valley, and important discoveries of various ores are now being made in its vicinity near the Upper Columbia and Upper Kootanie. It is naturally adapted to become a main line of communication between the southern and northern portions of the Province, near its eastern boundary.

The Gold Range.

The next mountain system to the south-west of the Rocky Mountains, referred to under the general name of the Gold Range, though really complex and somewhat irregular mountainous belt, which includes several more or less distinct and partly overlapping ranges. The Purcell, Selkirk and Columbia* ranges constitute its southern part, while to the north it is represented by the Cariboo Mountains, and still further northward,—after an important interruption,—by the Omenica and Cassiar mountains. These mountains are, generally speaking, less rugged in detail than the Rocky Mountains, including extensive areas of high, rolling plateau-country, and supporting in their southern and more massive portion, numerous glaciers and wide snow-fields. The highest summit so far actually measured is Mount Donald, on the line of the Canadian Pacific Railway, 10,645 feet. The forests of the Purcell, Selkirk and Columbia ranges are dense and tangled, and these mountains are much more difficult to traverse, and even less perfectly explored

* The name Gold Range is often specially applied to that here spoken of as the Columbia Range.

than the corresponding portion of the Rocky Mountains. Gran and crystalline schists of great age are abundant in the Gold Ra together with great masses of Palæozoic rocks, respecting the st tural relations of which very little is as yet known.

Principal metalliferous belt.

The Gold Range, as a whole, doubtless constitutes the most im tant metalliferous belt of the Province. The richest gold-fields closely related to it, and discoveries of metalliferous lodes are repor in abundance from all parts of it which have been explored. deposits already made known are very varied in character, includ highly argentiferous galenas and other silver-ores and aurifer quartz veins.

Interior Plateau of British Columbia.

Between the Gold and Coast ranges, lies a region, which for purpo of description, has been named the Interior Plateau of British Columl having an average width of one hundred miles and a mean elevat of about 3500 feet. Its height, on the whole, increases to the sou while northward, it falls gradually toward the group of large la and the low country about the head-waters of the Peace. This has, o a considerable part of its area, been covered by wide-spread flows basalt and other volcanic rocks in the later Tertiary period. It is n traversed in various directions by a system of deep, trough-like valle of erosion, generally occupied by streams and rivers. Water standi at an elevation of three thousand feet above the present sea-level wo flood most of these, and would divide its surface into a number islands, while a large tract of country about the 53rd and 54th par lels of latitude would be completely submerged. In some places t plateau is pretty level and uniform, but many portions of it attain elevation much exceeding the mean above stated, and it is usually on when broadly viewed, and in contrast with its bounding mounta ranges, that its character as a plateau is apparent. Its main area practically closed to the north, about latitude 50° 30′, by the ends several intercalated mountain ranges, in which many of the summ attain a height of 8000 feet. Nearly coincident with the 49th parall is a second transverse mountainous zone, formed in the same way, t only orographically important gap in which is that found in the vi nity of the Okanagan River. The southern portion of the Interi Plateau includes much open country, constitutes the best grazi region of British Columbia, and affords besides some good agricultur land. To the north, with increasing moisture, it becomes generall forested, but embraces large areas which are suitable for eventual agr cultural occupation.

Geology of the Interior Plateau.

The Tertiary rocks of the Interior Plateau hold, in many place beds of lignite or of coal. Where not concealed by the later rocks, th formations preponderantly represented belong to the Palæozoic ag

ese include very notable developments of materials originally vol-
nic in origin. The geological structure is scarcely less complex than
at of the mountain regions, and much yet remains to be done
ward its elucidation. The Interior Plateau also presents some
portant granitic areas, and, particularly toward its south-western
rder, limited basins of Cretaceous rocks. As a metalliferous region,
is destined to take high rank, particularly I believe in respect to
e precious metals, though its ores are too varied in character to
mit of description in a few words. Placer deposits of gold have
en worked in a number of widely separated localities, and platinum is
undant in the Similkameen region.

The Coast Ranges of British Columbia.

The Cascade Range of Oregon and Washington is largely composed
erupted volcanic materials, to which its characteristic features are
e, though these materials rest upon a basis of older rocks. Its
urse is north-and-south, and it is definitely terminated in the
inity of the International boundary. Near the mouth of the Fraser
ver its place is taken by a new mountain system, geographically
d geologically distinct, in the composition of which volcanic ejecta-
nta play no prominent part. This forms the third member of the
rdillera in British Columbia, and under the name of the Coast
nges, pursues a direct north-westward course for over 900 miles,
ming throughout this distance the bordering mountain-zone of the
ntinent. The Coast Ranges have an average width of about one
ndred miles, and consist of numerous constituent ridges and minor
untain axes with varied trends, frequently separated by deep parallel
d transverse valleys. The average altitude of the higher summits
between 6000 and 7000 feet, while some exceed 9000 feet. Glaciers
of frequent occurrence, and large in size, in the northern portions
the Coast Ranges. The mountains are, as a rule, densely forested
d extremely rugged, the flora of their seaward slopes being that
aracteristic of the West Coast and coördinated with its great humidity,
ile on north-eastern flanks the forest resembles that of the inland
nges.

Rocks of the Coast Ranges.

Geologically, the Coast Ranges owe the greater part of their eleva-
n to a period later than the Cretaceous, of which formation patches
found in them at great heights. The rocks consist chiefly of grey
nites and granitoid materials, with which are associated gneisses
d other crystalline schists, as well as Palæozoic rocks resembling
ne of those of the Interior Plateau. In association principally with
last-named rocks, gold-placers occur locally. Copper- and iron-ores
frequently found, and rich silver-ores have been discovered.

The name Vancouver Range, may be applied as a general one to the
rth great mountain-axis, which, in a partially submerged condition,

The Vancouver Range.

appears in Vancouver and in the Queen Charlotte Islands, and continued southward nearly to the Columbia River by the Olympia Mountains of Washington Territory. The islands of the Alaska archipelago have, on the map, the appearance of constituting a northern continuation of the same mountain system, but I believe that they may be more appropriately regarded, from an orographic point of view, as forming a partially submerged lateral expansion of the Coast Ranges. The highest mountain of Vancouver Island—Victoria Peak—reaches an elevation of 7484 feet, while there is a considerable mountainous area in the centre of the island, which surpasses 2000 feet in average altitude. Several summits in the Queen Charlotte Islands exceed 4000 feet.

Rocks of the Vancouver Range.

The Vancouver Range, while still to a considerable extent formed of crystalline rocks like those of the Coast Ranges, is principally composed of stratified rocks of Palæozoic and Triassic age, and is flanked in places, both on Vancouver and on Queen Charlotte Islands, by Cretaceous rocks, which are here important because of their coal-bearing character. The areas underlain by these rocks are in general comparatively low, and hilly rather than mountainous, while a large tract of level land, based upon the Tertiary formation, occurs in the north-east part of the Queen Charlotte Islands. Gold-placers have been worked in several places on Vancouver Island, but few ever attained much importance. Iron, copper and lead ores and gold-bearing quartz are also known to occur in connexion with this mountain-axis, but up to the present time the coal deposits have proved to be vastly its most important feature.*

General Notes on Mineral Deposits.

Similarity of rocks in different parts of Cordillera belt.

The general correspondence of that portion of the Cordillera belt included in British Columbia with that of the western portion of the United States, in some parts of which mining operations of the first importance have been in progress now for many years, has already been alluded to. No feature of the geology of the continent is more remarkable, than the general persistence of certain zones of similar rocks in a direction coincident with that of the Cordillera itself,—a circumstance in part due to the original similarity in conditions of dep

* In connexion with the foregoing outline of the ruling physical and geological features of the Province, it should be stated that while these features are moderately well known in the southern portion of the Province, and as far northward as the 56th degree of latitude, and the while in connection with the Yukon expedition some accurate information has been obtained for the extensive northern portion; there yet remains a large region, chiefly included between the 56th and 58th parallels, which, though touched upon here and there by the gold miner, is yet almost unknown geographically and geologically.

tion of sediments, and in part to their equal participation, at a later date, changes produced by like metamorphic agencies. The similarity us observed, in a series of geological zones parallel to the general rection of the Pacific Coast, is here more striking than the continuity the constituent orographic uplifts of the mountain-belt, and contrasts very markedly with the diversity of rock-formations found to cur where this belt is crossed at right-angles. While metalliferous posits individually are inconstant, and even the best defined lodes n be followed, in the vast majority of cases, for but a moderate distance, their character is found to depend fundamentally upon that of e enclosing or adjacent rocks, in which, under the required local namic and other agencies, these deposits are found to recur with early identical features. It is not intended here to discuss the resemances and differences of the various rock-series met with in the corsponding region in the Western States with those of British Columbia, t it may be mentioned, that the metalliferous districts of the Province ay with advantage be compared by the miner with those which have ready been more fully developed in each corresponding portion of e Cordillera region to the south, and that from such rational comparons, useful indications may be derived in the present early stages of e development of the mines of British Columbia.

Continuations to the southward of various mountain ranges.

The Rocky Mountains proper, as defined on a previous page, can arcely be traced southward, with identical characters, further than e main head-waters of the Missouri, beyond which the eastern ranges the Cordillera become more lax and irregular. The Gold Range ay, however, be followed further in a southerly direction, being connued by the Cabinet, Cour D'Alaine and Bitter Root mountains, for out 300 miles. The Interior Plateau of British Columbia repreents the Great Basin of Utah and Nevada and the great plains of e Columbia, and combines to some extent the features of both, ough differing markedly from the first in the fact that it is not here lf-contained as to its drainage, and from the second, in the diminished portance of its Tertiary lava-flood. It has already been stated, that e Coast Ranges of British Columbia are not continued to the south of e International Boundary. They resemble the Sierra-Nevada more losely than they do the Cascade Mountains of Washington Territory nd Oregon, and hold a similar relation to the Interior Basin with hat held by the Sierra. While, however, the Sierra owes its elevation a time immediately antedating the Cretaceous, the main uplift of e Coast Ranges of British Columbia occurred at or after the close of at period. The Vancouver Range, again, dating from the same eriod with the last, is not traceable south of the Columbia River, beond which, in Oregon and California, the Pacific is bordered by a

range of coast hills, which, from a geological point of view, are of very recent origin.

Auriferous rocks of British Columbia and California compared.

In California, the principal auriferous territory coincides with the run of a certain belt of slaty and schistose rocks, which occurs on the western flank of the Sierra-Nevada; these rocks being referred by their contained fossils, to the Triassic and Cretaceous divisions of the geological scale. In British Columbia, while rocks of Triassic age are largely developed, and in some cases with characters identical with those of the Californian gold-bearing rocks, no such persistent belt of these rocks is found in connexion with the Coast Ranges, where (from what has just been said of the resemblance of the two mountain systems) it might, from analogy, have been sought for. While local occurrences of rich gold-placers are known, in association with slates probably of Triassic age, on both sides of the Coast Ranges, the main auriferous territory in the Province is found to align itself on the Gold Range, and the original deposits of gold, from which the placers have been supplied, are already known to exist in different series of rocks widely separated in age and ranging all the way from the Triassic to the Cambrian. While, therefore, there is no single well developed gold-producing region, as in California, the area and mass of the rocks throughout which deposits of gold may be hopefully looked for, is here greatly increased. The circumstances would also warrant the belief that the mode of occurrence of gold in its original matrix might differ from that found to the south, and in particular that this might be more varied. So far as investigation has gone such a belief appears to be well grounded, and it would seem, that to a very considerable extent, the natural laws of this mining field must be worked out independently.

No Tertiary Coast Ranges in British Columbia.

In correspondence with the absence of the Tertiary Coast Hills of California, in which, under peculiar conditions of mineralization, the cinnabar ores of that State are developed, it is observable that in British Columbia no really important deposits of mercury have yet been discovered. It is by no means improbable that mercury-ores may yet be developed in the Province, but if so, it cannot be in any continuation of the Californian cinnabar belt, and the conditions of such deposits may be expected to prove unlike.

Coal-bearing Cretaceous rocks of British Columbia.

Another and very important point of diversity, is found as respects the Cretaceous rocks of the southern and northern coast regions. In California and Oregon, the mineral fuels which have been found and worked are lignites of Tertiary age and of an inferior value. Similar fuels are known on the coast of British Columbia, but the rocks of the Cretaceous here assume the *rôle* of a coal-bearing series and yield coals of excellent quality, which more than hold their own in competition with all other fuels employed on the Pacific.

Still another noteworthy circumstance of difference, and one which Effects of glaciation.
pplicable to practically the entire area of the Province when it is con-
sted as a whole with the Pacific States, is that which has been pro-
ced by the general spread and movement of ice over this region,
ing the Glacial period. The changes thus effected in the distribution
surface materials and directions of drainage have most important
rings on the question of placer-mining. They have also encumbered
surface of considerable tracts with "drift" deposits, which, while
ding to produce a more fertile soil, largely conceal the indications
which the prospector generally trusts in more southern latitudes.
the same time, a great part of the oxidised upper portions of
talliferous veins, together with the atmospherically decayed country-
k associated with these, has been removed, thus often obscuring the
crops of such veins, which would otherwise be well marked; and in
treatment of certain classes of ores, rendering it necessary to begin
rk from the first with machinery and processes which in some other
ions are only required after considerable depths have been attained.
These conditions, brought about by action during the Glacial period, Causes which tend to retard development.
amongst those which, in my opinion, have most tended heretofore
retard the development of metalliferous mining in British Columbia.
her circumstances which have operated in the same direction are;
densely wooded character of a great part of the country, the fact
t the rivers are suited for navigation only in detached reaches, the
noteness from the coast of the richest and best known placer-mining
tricts, and the cost of labour, supplies and machinery, which may
regarded as in part concomitants, in part direct results of these.
ing to the inaccessibility of the country, it has, till very recently,
n prospected and exploited by the placer-miner alone, who has been
erred by no difficulty from reaching the most remote spots in which
nour, or reasoning of his own, lead him to expect the existence of the
cious metal. Little knowledge or effort was expended in the search
metalliferous veins. Many such deposits supposed to be of value
re, it is true, located, and time and money which could ill be spared,
en uselessly spent upon them, leading only to discouragement.
en where the indications met with were altogether favourable, the
ginal discoverer generally found that the capital and knowledge re-
ired for their development were not at his command, and it was
ficult to interest those capable of dealing with such mines in a region
ich they could not easily visit and become familiar with at first
nd. With regard at least to the whole southern portion of the
ovince, however, all this is now happily changed.

While speaking of causes which have hitherto stood in the way of Exaggerated values.
n-mining, it must also be mentioned, that not the least important of

these has been, and still is, the fictitious or exaggerated value too fr quenty placed upon entirely undeveloped discoveries. While it manifestly right that the discoverer should be properly remunerate it should be remembered that a mere surface shewing, however pr mising, generally requires the expenditure of a large sum before i true value can even be ascertained, and that till thus developed it is u reasonable to expect a large payment for any mining claim.

Importance of British Columbia as a metalliferous region.

In preceding paragraphs, particular attention has been drawn t certain notable differences between the better known and more full developed regions of the southern part of the Pacific Slope and tho of the province of British Columbia, chiefly as a note of caution again the rash assumption of complete uniformity in conditions too ofte made without due investigation. The salient fact of the gener identity of the structural features of the Cordillera region south ar north, however, remain, and is such, that from this alone, even wit out taking into consideration the numerous and important discoveri already made, we should be justified in predicting an eventual gre development of metalliferous mining in the Province. It has alread been stated, that British Columbia includes a length of over 800 mil of the most important metalliferous belt of the continent, and addin to this the northern extension of the same belt, beyond the 60th para lel, we find that within the boundaries of Canada its entire length between 1200 and 1300 miles. This, as I have elsewhere noted, almost precisely equal to the whole length of the same region include by the United States from our southern line to the northern boundar of Mexico, and after having enjoyed, exceptional opportunities investigation, I feel no hesitation in recording my belief that th northern moiety of the Cordillera will ultimately prove to be suscep tible of a development corresponding in importance to that whic has already been attained in the southern.

Rise and progress of mining.

British Columbia first rose from the position of a fur country to th rank of a colony, on the discovery of gold upon the Lower Fraser i 1858. Its subsequent history, for a number of years, is substantiall that of the sudden rise and subsequent slow decline in importance placer gold-mining. Coal mining has, however, concurrently, advance slowly but steadily till it has obtained its present pre-eminent positio Such historical facts as appear to be important to the appreciation these industries are touched on later in connexion with them. Wit respect to vein-mining proper, we have as yet to chronicle merel the first steps, but in the southern part of the Province the completio of the Canadian Pacific Railway, has at length afforded the necessar impetus in this direction, and it is very gratifying to find, as an imm diate consequence, that this part of the country is rapidly beginning t

Present position.

ove its valuable character and to justify the confidence which those st able to form an opinion on the subject have always felt, and fre-ently expressed. Everything which has been ascertained of the geo-gical character of the Province as a whole, tends to the belief that so on as similar means of travel and transport shall be extended to what e still the more inaccessible districts, these also will be discovered to equally rich in minerals, particularly in the precious metals, gold d silver. In the southern district, for which information is most mplete, praiseworthy efforts are now in progress at a number of idely separated localities, toward the exploitation of ores, which, in any cases, have already been proved to be of an exceptionally valu-le character. Here at least, we have every reason to believe at we are on the point of witnessing the inauguration of an era of ining activity of the most important kind.

Publications Bearing on Geology, etc., of British Columbia.

List of reports cited.

The operations of the Geological Survey of Canada, were first ex-nded to British Columbia in 1871, when the former colony became a ovince of the Dominion. Since that date a number of reports bear-g on the Province have been published by the Geological Survey, hich are here enumerated, as frequent reference is made to them on bsequent pages :—

eport of Progress 1871–72.—*Selwyn :* Journal and Report of Preliminary Explorations in British Columbia. *Richardson :* On the Coal Fields of the East Coast of Vancouver Island, with a map of their distribution. Appended notes by *Dawson* (*J. W.*) and *Hunt* on Fossil Plants and on Coals.

eport of Progress 1872–73.—*Richardson :* On the Coal Fields of Vancouver and Queen Charlotte Islands, with a map of the former; an Appendix by *Dawson* (*J. W.*) on Fossil Plants ; another by *Billings* on Mesozoic Fossils ; and a third by *Harrington* on the Coals of the West Coast.

eport of Progress 1872–73 —*Richardson :* On Geological Explorations in British Columbia.

eport of Progress 1874–75.—*Richardson* : On Explorations in British Colnmbia.

eport of Progress 1875–76.—*Selwyn :* Report on Explorations in British Columbia, with sketch-map of route and appendices by *Macoun* on Botany ; *Whiteaves* on Fossils ; and *Le Conte* on Coleoptera.

Dawson (*G. M.*) *:* Report on Explorations in British Columbia; Appendix by *Scudder* (*S. H.*) on Tertiary Fossil Insects.

eport of Progress 1876–77.—*Dawson* (*G. M.*) *:* Report on Explorations in British Columbia, chiefly in the Basins of the Blackwater, Salmon and Nechacco Rivers, and on François Lake, with a coloured Geological map.

Dawson (*G. M.*) *:* Report of a Reconnaisance of Leech River and vicinity.

Dawson (*G. M.*) *:* General Note on the Mines, and Minerals of Economic Value of British Columbia, with a list of Localities.

Richardson: Report on the Coal Fields of Nanaimo, Comox, Cowicha Burrard Inlet and Sooke, British Columbia, with a coloured Geologic map.

Scudder (*S.H.*): Additions to the Insect Fauna of the Tertiary Beds Quesnel.

Report of Progress 1877–78.—*Dawson* (*G. M.*): Preliminary Report on the Phys cal and Geological Features of the Southern Portion of the Interior British Columbia, with a coloured Geological map.

Report of Progress 1878–79.—*Dawson* (*G. M.*): Report on the Queen Charlot Islands, with two coloured Geological maps and sketches of Harbour *Appendix A.*—On the Haida Indians of the Queen Charlotte Island *Appendix B.*—Vocabulary of the Haida Indians. *Appendix C.*—*Whiteave* On some Marine Invertebrata from the Queen Charlotte Islands. *Appe dix D.*—*Smith* (*S. J.*): Notes on the Crustacea from the Queen Charlot and Vancouver Islands. *Appendix E.*—*Macoun:* List of Plants from tl Queen Charlotte Islands. *Appendix F.*—Meteorological Observation *Appendix G.*—Notes on Latitudes and Longitudes.

Report of Progress 1879–80.—*Dawson* (*G. M.*): Report on an Exploration fro Fort Simpson, on the Pacific Coast, to Edmonton, on the Saskatchewa embracing a portion of the Western part of British Columbia and tl Peace River Country, with a map in three sheets, with Geological Indic tions. *Appendix I.*—*Macoun:* List of Plants collected in the Northe part of British Columbia and the Peace River Country. *Appendix II.* Meteorological Observations. *Appendix III.*—Note on Latitudes ar Longitudes of the Region from the Pacific Coast to Edmonton.

Dawson (*G. M.*): Note on the Distribution of some of the more importa Trees of British Columbia, with a map.

Report of Progress 1882–84.—*Bauerman* (*H.*): Report on the Geology of tl Country near the Forty-ninth Parallel of North Latitude, West of tl Rocky Mountains, from Observations made 1859–61.

Annual Report, 1885.—*Dawson* (*G. M.*): Preliminary Report on the Physical ar Geological Features of that portion of the Rocky Mountains betwee Latitudes 49° and 51° 30′, with two coloured Geological maps.

Annual Report, 1886.—*Dawson* (*G. M.*): Report on a Geological Examination the Northern part of Vancouver Island and adjacent coasts, with coloured Geological map. *Appendix I.*—*Whiteaves:* Note on some Mes zoic Fossils from various localities on the coast of British Columbi *Appendix II.*—*Macoun:* List of Plants from Vancouver Island and adj cent coasts. *Appendix III.*—Meteorological Observations.

Annual Report, 1887.—*Dawson* (*G. M.*): Report on an Exploration in the Yuko District, N.W.T., and adjacent Northern portion of British Columbi with an index map and a detailed map in three sheets, with Geologic indications. *Appendix I.*—Note on the Distribution of Trees. *Appendix I* —Note on the Indian Tribes. *Appendix III.*—*Macoun:* List of Plan *Appendix IV.*—Zoology. *Fletcher* (*J.*): List of Lepidoptera, etc. *Append V.*—*Adams:* Notes on Rock-specimens. *Appendix VI.*—Meteorologic Observations. *Appendix VII.*—Astronomical Observations.

Bowman: Report on the Mining Region of Cariboo. Part I.

Besides the reports above enumerated, which are contained in th

nual volumes of the Geological Survey, the following special reports aring on British Columbia have been issued by the Survey :—
Mesozoic Fossils. Parts I., II. and III., by J. F. Whiteaves. *Report the Polyzoa of the Queen Charlotte Islands* by T. Hinks' *Comparative ocabularies of the Indian Tribes,* by W. F. Tolmie and G. M. Dawson. Various contributions to the geology of the Province and to the howledge of its minerals, including several short reports by Mr. A. owman, are also to be found in the Annual Summary Report of the eological Survey, and numerous analyses of ores and minerals are cluded in the Contributions from the Laboratory of the Survey from 71-72 to date.
From the Annual Reports of the Minister of Mines of British Columa, from 1874 to date, much valuable and detailed information may so be obtained.
In the following pages, placer gold-mining is given the first place, as forms the natural introduction, from a historical stand point, to ining in general.

The Discovery of Gold.

The first authenticated discovery of gold within the limits of what is ow the province of British Columbia, occurred at Mitchell or Gold Harour, on the west coast of the Queen Charlotte Islands. This discovery reated considerable interest at the time, but was in no way connected ith the Fraser River excitement, and general commencement of placerining, which occurred later. As, however, the matter is of some storical interest, and as several versions of the affair have been given, e following notes derived from Mr. J. W. McKay, who was conversant ith all the circumstances, at the time, are inserted here.—The first old was a nugget accidently found by an Indian woman on the beach 1851. After a part had been cut off, it was taken by the Indians to ort Simpson and sold there, weighing, as received, between four and ve ounces. The nugget was then sent by the officer in charge, to the udson Bay headquarters at Victoria. The Company in the same ear sent the brigantine *Una* to the place of discovery, where a quartz ein seven inches wide and traceable for eighty feet was found, and ported to contain twenty-five per cent. of gold in some places. Some the quartz was blasted out and shipped, but the brigantine was lost the return voyage, at Neah Bay, near Cape Flattery, in the month December. In January, 1852, a U. S. brigantine, named the *Orbit,* hich was on the rocks in Esquimalt Harbour, was bought by the ompany, registered under the British flag, re-named the *Recovery,* and nt north with thirty miners in addition to the ships company, the

Original discovery of gold in the Queen Charlotte Islands.

miners going 'on shares' in the venture. Three months were spent i getting a cargo of the quartz, which was eventually sent to Englan the miners receiving $30 a month each as the result. Meanwhile, th discovery having become known, several little vessels from San Fra cisco followed the *Recovery* to the Queen Charlotte Islands, and H. M. *Thetis* was sent from Valparaiso to keep order. The deposit prove however, to be quite limited, and these vessels, as well as the *Theti* shortly left. Soon after, a vessel named the *Susan Sturgiss* arrive and the captain (Rooney) collected a quantity of the quartz which ha been discarded by the *Una* expedition, and taking it to San Francisc realized $1400 on it. A second trip made by this vessel in the sam year, ended disastrously, the vessel being captured by the Indians a Masset, and the crew kept as prisoners for some time till released b the Hudson Bay steamer *Beaver*. It would appear that gold to th value of about $20,000 may have been obtained from this little vei while an estimate as high as $75,000 has been made.

Discovery of gold-placers.

It is now difficult to ascertain under what precise circumstances th first discovery of gold placers on the mainland of British Columbi occurred. Little attention was at first given to accounts of the findin of small quantities of gold, and at a later date, when gold minin sprung into importance, numerous stories respecting its discover were invented or exhumed.* One statement, is to the effect that th Hudson Bay Company's agent at Kamloops had bought gold from th Indians as early as 1852, but, if correct, the amount purchased mus have been very small. In 1855, a servant of the same Company di covered gold near Fort Colville, a short distance south of the Inte national boundary, and moderately rich diggings began to be worke in that vicinity. It seems certain that the epoch-making discovery gold in British Columbia, was the direct result of the Colvil excitement. Indians from the Thompson River, visiting a woman their tribe who was married to a French Canadian at Walla-Wall spread the report that gold, like that found at Colville, occurred also i their country, and in the summer or autumn of 1857, four or five Can dians and half-breeds crossed over to the Thompson, and succeeded i finding workable placers at Nicoamen, on that river, nine miles abov its mouth. On the return of these prospectors the news of the di covery of gold spread rapidly. It is also probable that their arrival o the Thompson caused the Indians to take an interest in gold-mining for we read in a despatch of Governor Sir James Douglas, that fro October 6, 1857, to the end of that year, three hundred ounces of gol had passed through the hands of the Hudson Bay Company, thi amount being all, so far as known to Douglas, which had been obtained

Gold first obtained.

* See Bancroft's Works. vol. xxxii, chapter xx.

glas speaks of the region including the Lower Thompson, from h the gold came, as the "Couteau Country."

Influx of gold-seekers.

early ten years previously, in 1849, gold had been discovered in ornia, and that country was swarming with a cosmopolitan popun of gold-seekers; thus when the discovery of gold in the n became known and authenticated by the exhibition of the gold , an extraordinary migration followed. Between March and June, , from 20,000 to 23,000 persons arrived by sea from San Francisco ictoria, and converted that place (first founded by the H. B. Com- in 1843) from a quiet village of 200 or 300 inhabitants, into a of tents. At the same time, many miners (estimated by some at in number) reached British Columbia by overland routes from outh. A large proportion of those who arrived at Victoria never o far as the mount of the Fraser River, their objective point, and eat were the natural difficulties and the resulting disappointment rienced, that all but about 3000 of this promiscuous migration ned to California before the following January. The inland try was entirely without routes of communication, by nature gularly difficult one, and unprovided with means for the support large population. Meanwhile, by the more fortunate and energetic, development of its wealth had been fairly inaugurated. The erous river-bars in the vicinity of Hope and Yale on the Lower er being the most accessible, were the first to be worked, and the n of gold began to assume important dimensions. The actual nents made from Victoria during the first five months of work in are stated as below *.—

First shipments of gold.

June	$ 6,000
July	45,000
August	45,000
September	164,000
October	283,000
	$543,000

Progress of Placer Gold-mining.

is impossible here to follow the further progress of gold discoveries ritish Columbia in detail, though such facts relating to discovery former mining, as appear still to possess importance as guides to e development, are mentioned in connexion with the several dis-

cording to Macfie, Vancouver Island and British Columbia; London, 1865, p. 72. There are have been 4000 miners along the Fraser between Hope and Yale, in November, 1858. pe 400, and at Yale 1300.

tricts and localities to which they relate.* A few words must suf to indicate in a general way the progress of the army of gold-min the outlines of the topographical features of the Province previou given, serving to acquaint those not personally familiar with it, w the salient features of the regions which were thus rapidly overspr

Progress of mining 1858 to 1860.

Before the close of the working season in 1858, some of the adv turers who had come overland from the south, had pushed onward face of extraordinary difficulties,—resulting not alone from the rou ness of the country itself but combined with the want of supplies occasional overt hostility of the Indians,—as far as Fountain, a sh distance above Lillooet on the Fraser, and by the line of the Tho son to Tranquille River on Kamloops Lake. In the following ye renewed advance brought a number of miners to the Quesnel River, in 1860, rich diggings were found at The Forks of the river and over Whites were at work on its length, while Antler Creek was discove and some work done upon it by a few score men,—thus fairly entere the extremely rich central region of Cariboo. Also in this year, g placers were found on the Similkameen, in the southern part of Province.

Theory of the miners.

The theory formed by the miners who first worked the fine 'flo gold of the Fraser below Yale, was that this gold had its origi richer deposits toward the sources of the great river, and though theory was only very partially correct as regards the origin of th particular deposits, it none the less served as the impelling force wh led to the opening up of the Cariboo district.

Early discoveries in Cariboo.

In 1861, Williams and Lightning creeks, Cariboo, the two most brated in the annals of British Columbian placer-mining, were covered, and in this and the following year most of the other creeks in Cariboo became known. The first gleanings from the Cariboo stream-courses were notable. It is estimated that gold to value of $2,000,000 had been got out by a population not excee 1500 before the end of 1861. In consequence of those finds a se important migration of miners and others towards the Province menced before the close of 1861, which continued in greater or volume till about 1864. A series of letters from a corresponde the "Times" contributed largely to this result, and extended the of interest to very wide limits, bringing adventurers from Eng

* A mass of information respecting the historical and other features of gold-mining Province is contained in Bancroft's Works, vol. xxxii, History of British Columbia. details there collected may be consulted with advantage, and have been frequently referre connexion with localities mentioned in later pages of this report. It must be added, ho that many of the statements quoted by Bancroft must be accepted with caution, having derived often from the newspapers of the time, and other sources not always trustworth which it has naturally been impossible for the compiler to check, and many of which call intimate local knowledge of the country, even to properly correlate.

ada, Australia and New Zealand. A party of men even set out for iboo from Eastern Canada overland, in 1862. Of this party eral members lost their lives in the mountains, but some eventu- reached their destination.

further consequence of the Cariboo excitement was to depopulate ost completely the other mining camps in the Province, even those ch were yielding a good average return for work, some promising lities lying untouched for years afterwards, or falling entirely into hands of the Chinese and Indians.

Discoveries on Wild Horse Creek and Leech River.

n 1863, however, rich placer deposits were found on Wild Horse ek in the Kootanie region, the extreme south-east portion of the vince. These caused considerable local excitement at the time. were somewhat extensively worked in the following year and reafter, notwithstanding the attraction of Cariboo. In 1864, Leech er, in the southern part of Vancouver Island not far from Victoria, s discovered to be auriferous, and in 1865 a number of miners from Kootanie district were prospecting and working in the neighbor- Big Bend (of the Columbia) country, the report of their success re- ting in the Big Bend excitement of 1866. This subsided almost as ckly as it had arisen, the number of men who rushed to the place ng much too great for the opportunities of work.

Gold on Peace River and Omenica.

Though miners from Quesnel, following the routes employed by the dson Bay Company, had reached and worked with some success on ace River as early as 1861, it was not till 1869 that the richer posits of the feeders of the Omenica Branch of that river near lat. were discovered, and the Omenica excitement did not attain its ght till 1871. In 1872, the rich northern mines of the Cassiar dis- ct, on the head-waters of the Dease, were brought to light, and a neral migration in that direction occurred, which, in 1873, led to the nost complete abandonment of Omenica.

Cassiar and Yukon.

The discovery of the Cassiar mines carried the miners to the vicinity the 60th parallel, the northern boundary of the Province. Gold was xt found in paying quantities on the tributaries of the Yukon, still ther to the north, in 1880.* No such rush has occurred to this dis- ct as happened in the case of some of those previously mentioned, t in 1886, the miners were at work as far north as lat. 64° 30′ having nd 'coarse' gold there on Forty-mile Creek.

Granite Creek.

Granite Creek, a tributary of the Similkameen was found to yield h diggings, in 1885, and though it has not proved to be as important at first hoped, it has led to renewed activity in its vicinity.

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* Whymper states, however, in 1869, that gold had been found in minute specks by employees the Hudson Bay Company before that date. Travels in Alaska and on the Yukon, 1869, p. 227.

Region of the principal gold deposits.

While it may now be safely affirmed that gold is very generally tributed over the entire area of the province of British Columbia, much so that there is scarcely a stream of any importance in which least 'colours' of gold may not be found, the enumeration of the pr cipal discoveries of important mining districts, shows very clear that most of these are situated along the system of mountains and hi plateaux which comprises the Purcell, Selkirk, Columbia and Caril ranges and their north-western continuations, lying to the south-w of the Rocky Mountain Range properly so called, and parallel in dir tion with it. Of all the gold-producing districts that of Cariboo l proved the richest and the most continuously productive.

Yield of Gold.

Explanation of table annexed.

The first part of the annexed table, extending to the year 1875, w originally prepared in Victoria by Mr. Charles Good (then Depu Minister of Mines and Provincial Secretary) and the writer, in t winter of 1875-76. It was first published in the Annual Report of t Minister of Mines for 1875, and has since been republished annually the same report, with the necessary additions. It is based through on the amounts of gold shipped by the banks, express and other co panies from Victoria, this being the best available means of ascertaini the yearly product. It has from the first been impossible to ascerta the amount of gold annually taken away in private hands, largely Chinese, and no account was obtained of the gold carried south from t Kootanie and Similkameen county, which did not pass through Victor To allow for these amounts, an addition of one-third is made to the amou actually known to have been exported, up to the year 1877. In so of the earlier years it is probable that this addition is an under-estima while the reverse may hold in the case of the years immediately p ceeding 1877. Subsequent to the year 1877, an addition of one-fi only has been made in the British Columbian report. It will thus apparent that the figures given can only be accepted as a near app ximation to the actual yield.

Under the year 1887 a small quantity of bullion obtained from quartz mine is added, but the amounts are otherwise entirely due placer-mining.

TABLE shewing the actually known and estimated yield of gold; the number of miners employed; and the average earnings per man, per year from 1858 to 1888, in the Province of British Columbia. Gold product of British Columbia.

Year.	Amount actually known to have been exported by Banks, &c.	Amount added to represent gold carried away in private hands.	Total.	Number of Miners employed.	Average yearly earnings per man.
	$	$	$		$
58 (Partial return.)	543,000	.....	*705,000	3,000	235
59.....	1,211,304	1-3rd 403,768	1,615,072	4,000	403
60.....	1,671,410	" 557,133	2,228,543	4,400	506
61.....	1,999,589	" 666,529	2,666,118	4,200	634
62.....	1,992,677	" 664,226	2,656,903	4,100	648
63.....	2,935,172	" 978,391	3,913,563	4,400	889
64.....	2,801,888	" 933,962	3,735,850	4,400	849
65.....	2,618,404	" 872,801	3,491,205	4,294	813
66.....	1,996,580	" 665,526	2,662,106	2,982	893
67.....	1,860,651	" 620,217	2,480,868	3,044	814
68.....	1,779,729	" 593,243	2,372,972	2,390	992
69.....	1,331,234	" 443,744	1,774,978	2,369	749
70.....	1,002,717	" 334,239	1,336,956	2,348	569
71.....	1,349,580	" 449,860	1,799,440	2,450	734
72.....	1,208,229	" 402,743	1,610,972	2,400	671
73.....	979,312	" 326,437	1,305,749	2,300	567
74.....	1,383,464	" 461,154	1,844,618	2,868	643
75.....	1,856,178	" 618,726	2,474,904	2,024	1,222
76.....	1,339,986	" 446,662	1,786,648	2,282	783
77.....	1,206,136	" 402,045	1,608,182	1,960	820
78.....	1,062,670	1-5th 212,534	1,275,204	1,883	677
79.....	1,075,049	" 215,009	1,290,058	2,124	607
80.....	844,856	" 168,971	1,013,827	1,955	518
81.....	872,281	" 174,456	1,046,737	1,898	551
82.....	795,071	" 159,014	954,085	1,738	548
83.....	661,877	" 132,375	794,252	1,965	404
84.....	613,304	" 122,861	736,165	1,858	396
85.....	594,782	" 118,956	713,738	2,902	246
86.....	753,043	" 150,608	903,651	3,147	287
87.....	578,924	" 115,785	693,709	2,342†	296
88.....	513,943	102,788	616,731	2,007	307

Total known and estimated yield of gold, 1858 to 1888...	54,108,804
Average number of miners employed yearly.....	2,775
Average earnings per man per year.....	622

* Waddington's estimate.

† Exclusive of a number of men working on or prospecting for quartz.

Changes made in table as here published.

In comparing the years 1858, 1862 and 1863 of the above table wit the same years as represented in the table as formerly published, it wi be observed that the amount of gold is increased. This arises from th circumstance that some additional returns of exports, not accessib when the table was first prepared, have now been taken into conside ation. These returns are to be found in Macfie's Vancouver Island an British Columbia and in Bancroft's Works, Vol. XXXII. There appea to be no doubt of the authenticity of these returns, and their additio brings the average earnings of the miners employed in the years i question into better correspondence with the number of the miners an with what is known of their success at the time.

Fluctuation in gold yield.

The most noticeable point brought out by the table is the great yiel of gold resulting from the discovery and early years of working in th Cariboo district, and the gradual and scarcely interrupted decline i the product of the placers which has since occurred. The gold-yiel also, however, shows a fluctuation from year to year, particularly whe it is considered in connextion with the number of men actually at worl This depends not alone upon the uncertainty of the deposits worke and the development or otherwise of new fields, but also to a consider able extent on varying climatic conditions, some seasons being ver unfavourable to placer-mining on account of floods or prolonged hig water.

Gold Mining Districts.*—*Placer.*

Fraser and Thompson Rivers.

Character of the Fraser.

The Fraser carries to the sea a great part of the entire drainage c the interior of British Columbia. At its mouth, the great quantity c detritus which it has brought down has formed an extensive delt Followed up to the vicinity of Hope, its valley becomes defined b bordering mountain-ridges which gradually converge to the mouth c the cañon at Yale. This lower part of the valley must be regarded a an ancient salt-water inlet which has been filled up by the materia transported by the river, the harder and older rock-bottom of the valle being generally covered to a great depth. Between Yale and Bosto Bar, (nearly opposite North Bend on the Canadian Pacific Railway, it breaks through the axis of the Coast Ranges, flowing in a series c

* For administrative purposes, and in connexion with mining, the following districts are r ecognized by the Government of British Columbia.—Cariboo, Cassiar, Omenica, Lillooet, Yal West Kootanie, East Kootanie. Some of these districts are very extensive, and the term distri is here employed in a more restricted, if somewhat less definite sense, as a convenient one und which to group the various metalliferous occurrences. Thus the Cariboo district technical includes the Parnip River and upper part of the Peace River, while from the point of vie of placer-mining, these are more appropriately treated of under the heading Omenica.

ld rapids through a ragged gash in the mountains. Along the sides this cañon a scarcely passable goat track existed when the gold-ners first arrived on the scene. Beyond Boston Bar, the valley becomes direct and deep north-and-south furrow all the way to Fort George latitude 54°. The southern part of this portion of the valley cuts diquely through the inner tiers or flanking ridges of the Coast nges, but its northern and upper part is excavated in the plateau the interior, to the east of these ranges. From the point of view the gold-miner, the Fraser may be regarded as a gigantic ground-ice. Its valley, originally excavated in Tertiary times, in the ky substratum of the country, was subsequently, during the cial period, largely filled with drift material; through which, at still later date, the river has had to re-excavate its bed, leaving eat series of terraces or "benches" along its banks in many places, this was gradually accomplished. A portion of the gold now nd in its bed and banks has without doubt been worn out of rocky matrix directly by the action of the river and its im-diate tributaries, while another portion may have been derived m the glacially transported drift materials. The first-mentioned iety may be supposed to include the 'coarse' gold, the last must in great part 'fine' gold.

Origin of the gold.

A great proportion of all this gold, from whatever source derived, s been gradually concentrated in the river-bottom by the action of the eam, while in many places paying deposits have been left upon the rfaces of 'benches' at various levels, or buried beneath their material, ch such 'pay streak' representing some portion of a former bed of e river which has been left behind as erosion progressed. Thus when e work of 1858 and 1859 began, the miners obtained, with compara-e ease and in a short time, a large quantity of gold. How much ld has been obtained from the Fraser and the lower part of the ompson it is impossible to ascertain, but it may be stated that prac-ally the entire output of the Province for 1857 and 1858, with the eater part of that for 1859, was derived from this river, and by far e larger portion from that part of the Fraser extending from Hope the mouth of the Quesnel. The aggregate yield for these early years one cannot be placed at less than $1,700,000.

Distribution and quantity of the gold.

The mode of working these gold deposits was comparatively a simple e. The so-called 'bars' were nothing more than portions of the ver-bed, which, being left bare at low water, could be reached by the iner. They varied in richness not only in different parts of the ngth of the river, but also in correspondence with the local relation the currents and set of the stream. They were worked generally but a very limited depth, being often merely skimmed over, in con-

Character of deposits.

Mode of working.

sequence of the trouble from water and the cost of removing ar considerable thickness of non-remunerative material to reach deep underlying 'pay streaks.' Most of the work was accomplished wit the primitive rocker, and in 1858 no other means was employed on th portion of the river below Yale. At Yale, and further up, even in th year, sluicing was resorted to in some places, and a number of sho ditches were constructed for the purpose of bringing water to the plac worked. There were also, from the first, certain 'dry diggings' recognized and worked; these being auriferous layers in river-flats benches which were above the high-water mark of the stream. Whe

Partial abandonment of the Fraser.

the exciting discoveries in Cariboo district became known, the Fras was almost abandoned, long before its placers had ceased to be rem nerative, but since that time more or less desultory work along th Fraser and Thompson has never ceased. A great number of the hig benches have been in part superficially worked, and have in some cas yielded excellent results. In the bed of the river itself, at each seaso of flood, a partial re-arrangement of material occurs, and addition supplies of gold are brought in by the wearing away of the banks, feature having important bearings on the probable successful applic tion of hydraulic mining to some of these deposits.

Though no longer exceptionally rich, the bars and benches of th Fraser seem to afford a practically inexhaustible supply of gold. Ha no further discoveries occurred in the north, the Fraser would not soon have been deserted by the energetic white population, but wi the gradual improvement in methods of mining would have bee made to yield a vastly greater amount of gold than it has yet produce Nothing illustrates this fact more forcibly than the table given below

Hill's Bar.

the annual yield of the river during late years. Hill's Bar, near Yale, ha probably afforded more gold than any other single locality on th Fraser. It was estimated to have produced in all, (to 1875,) not le than $2,000,000 worth of gold from a total area of less than half square mile. (Report of Minister of Mines of B. C., 1875, p. 17.) I position at the foot of the very rapid portion of the Fraser, where th river first frees itself from the cañon and expands to a greater widt with a slacker current, is a suggestive one in respect to the origi of its gold. Instances of the yield of other bars are given in con nexion with their enumeration on page 115 R, *et seq*.

Partial statement of value of gold derived from the Fraser River and some of its tributaries, approximately as included in the list of localities, pp. 115 R *to* 119 R, 1874 *to* 1888.

1874	$ 55,000
1875	50,000
1876	42,000
1877	37,000
1878	14,000
1879	54,000
1880	93,300
1881	75,184
1882	70,200
1883	73,000
1884	122,934
1885	123,700
1886	157,000
1887	126,000
1888 (partial, not including Lower Fraser)	90,160

Yield of the Fraser.

The above table is derived from the returns in reports of the Minister f Mines of British Columbia. It is, unfortunately, very imperfect, ven for the years which it professes to represent. It is more than sually difficult to obtain returns from the Chinese and Indians, in hose hands a large part of the work done here is. In addition, the eturns for the several years are not strictly comparable, and do not in ost cases include all the several localities referred to in the title. No eturns appear to have been obtained from the Lillooet region in some ears, and in others a portion of the upper part of the river is included n Cariboo district. I believe it would not be excessive to estimate he yield of the Fraser, including the Main Thompson River, Bridge iver, and the Lillooet country at $100,000 per annum since 1860, hich would give a total yield from that date to 1888, of about 2,900,000.

Future prospects of work.

It scarcely I believe admits of doubt, that extensive and successful ining enterprises based on the application of the hydraulic method f working, will yet be instituted along a great part of the length of he Fraser valley, while dredging or other methods by which the aterials of the bottom may be obtained and treated, may also be rofitably employed. The great extent of the bench or terrace eposits of the valley, with the excellent opportunity of disposing of he waste, offer exceptionally favorable conditions for hydraulic work, nd tributary streams with a sufficient quantity and head of water or mining purposes are not wanting.

Importance of recording observations on placers.

On a subsequent page, a list is given of the principal bars and diggings which were formerly worked along the Fraser River. This list is as complete as the available information permits, both in regard to the names and positions of the bars, and in respect to their yield and the quality of the gold. It may be objected, that as many of these deposits have now ceased to be continuously worked, such a list possesses merely a historical interest. This, however, is far from being true. It is of importance, not only as a guide to the selection of localities for hydraulic or other similar systematic work on a large scale but also as affording a clue to the places of origin of the gold, and in directing the search of the explorer who is in quest of paying deposits of gold in its original matrix.

'Coarse' and 'fine' gold.

It is unfortunate that so much of the practical information obtained by the early miners is now irrecoverably lost, but an examination of that which I have been able to obtain is sufficient to lead to certain general conclusions. Nothing has been more certainly ascertained in connexion with placer-mining in general, than that the 'coarse' or 'heavy' gold, unless under very exceptional conditions, does not travel far from the place of its origin, even in very rapid streams. 'Scale' or 'flour' gold may, however, be transported to great distances by a river such as the Fraser, before it finds a final lodgment, or becomes reduced by attrition to invisible shreds.

Fine gold on the lower river.

The lowest bar on the Fraser which was found to yield remunerative returns, was Maria Bar, about twenty-five miles below Hope, and nearly opposite the mouth of the Chilliwack River. Thence to Hope, and in the neighborhood of that place, all the gold found was 'flour' gold, of great fineness. In ascending from Hope to Yale, however, it was observed that the bars became richer and the gold was often not so fine. It is highly probable that all this gold was transported by the river itself, and that none of it has a local origin. From a point on the river a few miles below Boston Bar (or about sixteen miles above Yale) to Sisco Flat, a short way below Lytton, a distance in all of about twenty-five miles, rich deposits of 'heavy' gold were worked. Further up the river is a second run of 'heavy' gold, the limits of which cannot now be so well defined, but which appears to have extended from a point about half-way between Lytton and Foster's Bar, to some little distance above Fountain. Here nuggets of some size were occasionally unearthed, and there were some exceptionally rich diggings. On the Thompson, the vicinity of Nicoamen, where the original gold discovery occurred, has always been noted for its 'coarse' gold.

Runs of coarse gold.

Connexion of coarse gold with rock-formations.

On comparing the portions of the Fraser River thus found to yield 'coarse' gold with the rock formations of the country, it is found that

e first described run of 'coarse' gold corresponds almost exactly ith that portion of the valley which is excavated in certain schistose gillites and micaceous and other schists of dark colour to which the me of Anderson River series has been provisionally assigned. It ust, however, further be remarked that a series of Cretaceous argil- tes, conglomerate and sandstones which have probably been deposited a still earlier hollow excavated along the out-crop of the soft rocks of he Anderson River series, also runs parallel to this part of the river, on s east side; and that while it is probable that the gold has originally een derived from the Anderson Rivers eries, a portion of that now found the river may have been obtained by the robbing of Cretaceous placers ontained in these later rocks. This is rendered all the more probable, y the fact that the second run of 'coarse' gold again corresponds with similar trough of Cretaceous rocks, in the bottom of which, though he occurrence of the Anderson River schists is known in some places, as near Lillooet), these older rocks are not extensively exposed by the resent river.

Coarse gold at Nicoamen.

Near Nicoamen, on the Thompson, the 'coarse' gold is found along portion of the river which follows the junction of granitic rocks with the edge of a great thickness of Tertiary rocks, chiefly of volcanic rigin. I have supposed that the gold may here occur in a disseminated form in some of the volcanic rocks or may possibly have been robbed from Tertiary placers occurring beneath the volcanic part of the series.

Guidance in search for gold-ores.

The 'coarse' gold is, in any case, on these rivers, distinctly in association with certain geological conditions which offer a fairly certain clue as to the rock-formations in which it should be sought for, either in the form of lodes, or in a disseminated state in certain beds. The precise location of exceptionally 'coarse' gold in certain bars and benches, making due allowance for a certain amount of movement down stream, should further give an indication of the actual localities in which the search for gold in its matrix may be engaged in with the greatest prospects of success.

Belt of gold-bearing rocks.

It may further be observed, that gold has been found on the Anderson River, on Lillooet River and on Bridge River, all nearly on the line of strike of the Anderson River series and the overlying Cretaceous rocks, in such a manner as to mark out pretty distinctly the course of an auriferous belt to the east of, and parallel with, the axis of the Coast Ranges.

Cariboo District.

The Cariboo district,* entered by the miners in 1860, has ever since produced the greater part of the gold of the Province. It has proved to be one of the best 'placer-mining camps' ever discovered, and though most of the heavy runs of gold on bed-rock, so far found, may now be considered as worked out, its capability as a field for placer-mining of one kind or other, is by no means exhausted, and the very limited area within which some of the richest finds have occurred, encourages the belief that no great difficulty will eventually be found in tracing these alluvial deposits to their sources.

Physical characters of the Cariboo district.

The fifty-third parallel of north latitude passes through the centre of the Cariboo mining district, which may be described as a mountainous region, but is perhaps rather to be regarded as the remnant of a great high-level plateau, with an average elevation of from 5000 to 5500 feet, dissected by innumerable streams which flow from it in every direction, but all eventually reach branches of the Fraser River. These streams, falling rapidly about their sources over rocky beds, descend into great V-shaped valleys, and, with the lessening slope, the rock becomes concealed by gravel deposits, which increase in thickness and extent till the valleys become U-shaped or flat bottomed, and little swampy glades are formed, through which the stream flows tortuously and with gentle current. The steep-sloping banks of the valleys are densely covered with coniferous forest, of which comparatively little has been destroyed by fire, owing to the dampness of the climate at this great altitude. The surface of the broken plateau above is often diversified by open tracts, affording good pasture in summer; and the whole country is more or less thickly covered by drift or detrital matter, concealing the greater part of the surface of the rocky substratum.

Progress of mining.

As in all new gold-mining districts, the shallower placer deposits, and gravels in the present stream-courses first attracted attention, but with the experience of California and Australia, it was not long before the 'deep-diggings' were found to be far the most profitable. Williams and Lightning creeks have, so far, yielded the greater part of the gold of Cariboo. They were known from the first to be rich, but have been found specially suited for deep work, in having a hard deposit of boulder-clay beneath the beds of the present water-courses, which prevents the access of much of the superficial water to the workings below.

Deep mining and old channels.

By regular mining operations, the rocky bottom of the valley is followed beneath fifty to 150 feet of overlying clays and gravels, the

* This term is here used in a restricted sense, being applied to the mining region, and not to the much more extensive electoral district of the same name.

rse of the ancient stream being traceable by the polished rocks of bed, and the coarse gravel and boulders which have filled its chan-

In the hollow of the rocky channel the richest 'lead' of gold is ally found, but in following the rock-surface laterally, side-ground, enough to pay well, is generally discovered for a greater or less th. The old stream-courses of the Cariboo district are found to have sued very much the same directions that their present representa-s follow, crossing often from side to side of the valley with different ures, and occasionally running through below a point of drift erial projecting into the modern channel, but never, I believe, ially leaving the old valley or running across the modern drainage em, as is so often the case in the deep placers of California and tralia.

Deep mining on Williams and Lightning Creeks.

he most important deep work was carried out in the old pre-glacial buried channels of Williams and Lightning creeks, where it has practically almost ceased. As the methods employed are, how-r, of interest in illustration of the mode of occurrence of the richer d deposits, and may yet be applied to other valleys even in this dis-t, the following description is included. It will serve as a general cription of this class of mining, and is substantially the same with t given in the previous publication on the mines of British Colum-, and refers particularly to the work in progress at the time of my t to Cariboo in 1876.

Shaft-sinking.

o reach the buried channel, on which it is generally impossible to k directly through the superposed loose and watery materials, a ft is usually sunk at the lower, or down-stream end of the claim, on sloping side of the valley, where, after having gone through a mod-te depth of clay or gravel, the slaty rock of the district is reached. e shaft is then continued through this, till a depth supposed to be icient is attained, when a drift is started at right angles to the rse of the valley, and if the right depth has been chosen,—either by gh estimation, or calculation based on that required in other ghbouring workings—the old channel is struck in such a way as to ble the subterranean water collecting in it from the whole upper t of the claim, to be pumped to the surface by the shaft. On driving of the slate rock, however, into the gravel, so much water is quently met with that the pumps are mastered, rendering necessary essation of work till the latter part of the season, or the applica-n of more powerful machinery. When the drift is not found to be a sufficient depth to cut the bottom of the old channel, it is generally essary to close it, and after continuing the shaft to a greater depth, drive out again. The old channel once reached, and cleared of ter, is followed up its slope by the workings, to the upper part of claim, and where paying side-ground occurs this is also opened.

Drifting.

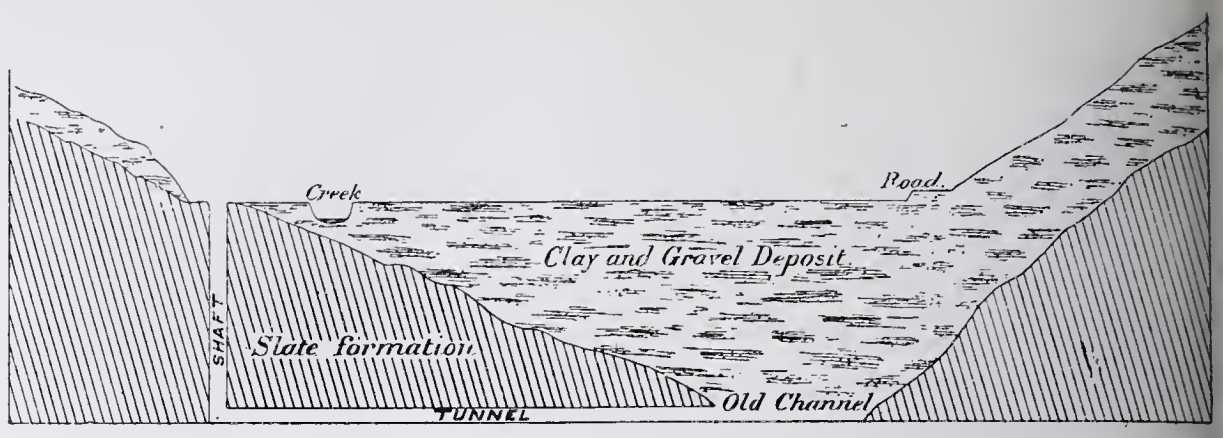


Fig. 1. Section across Lightning Creek valley at the lower end of Victoria Claim, shew position of old channel, etc. From report by J. Evans, in Report of Minister of Mines British Columbia, 1875. Approximate scale 120 feet to one inch.

Character of the buried deep channel.

The richest pay is generally obtained in the actual channel of the c stream, but where this is much contracted the force of the water is oft found to have swept the gold away to those places where its width greater. The harder rocks still preserve their polished and wat worn forms, but most of the slates are rotten and crumbling, to a co siderable depth, and in cleaning up in the bottom, a thickness of o to two feet is frequently taken out with the pick and shovel, and se up to the surface with the overlying gravel, for treatment. In t side-work, as in the central channel, the greater part of the gold found lying directly on the 'bed-rock,' though, in some cases, par cularly on Williams Creek, paying layers occur in the gravel seve feet above it. The side-ground is worked up from the channel in su cessive breasts parallel to it.

Deposits of old channels.

The lowest layers of gravel generally contain many large boulde of quartz and slaty fragments not much water-worn, which must ha come down from the hill-sides; the appearance being that of depo by torrential waters to a depth of four to six feet in the channel, abo which the gravel is generally better rounded, and more evenly spre though still mixed with clayey-matter.

Difficulties from water, etc.

In consequence of the unconsolidated nature of the gravel, the pr sure on the supports of the workings is often excessive. The sets timber are, in some places, only a few inches apart, and the whole the workings have, in some cases, to be lined with complete laggi The timber used is usually massive, being from one to two feet average thickness, and consisting of the spruce of the country, simp barked and sawn into lengths. Its cost delivered at the mine at t date mentioned, was eight cents per running foot, all suitable sizes bei taken at the same rate. The lagging, which is merely split out, fo feet long, five inches wide, and two thick, cost seven dollars a hundr pieces. With every precaution, the timbers are frequently crushed the pressure, or the uprights even forced downward into the sla

Where large boulders are removed from the sides, or 'slum' is found, ...ruce brush requires to be extensively used behind the lagging, and ...many places the water streams from the roof like a heavy shower of ...n.

The whole of such deep workings were, as a rule, annually filled with water at the time of the spring floods, and it was sometimes not till ...e in the summer or autumn that the pumps again acquired the ...stery. Flooding of workings.

The following are particulars referring to the Van Winkle mine on Lightning Creek, which was the most successful in operation at the ...ne of my visit in 1876. Van Winkle mine.

The claim covered about 2050 feet in length of the valley, the ...pest part of the old channel of which had been cleared out to a ...gth of between 1600 to 1700 feet in October of 1876. Much side-...ound, however, yet remained, and the workings sometimes attained ...idth of from 200 to 300 feet in following this up as far as it could ...made to pay. The claim yielded the first dividend in December, ...3, $40,000 having been expended before gold was reached in the ...nnel. It afterward paid handsomely, having produced in one week ...d worth $15,700, and on other occasions at the weekly 'clean-up,' ...ns of $14,000, $12,000, etc. At the date above mentioned the total ...oduct of gold had amounted to the large sum of $500,965.

In the Van Winkle mine, the average depth of the workings was about ...enty feet only, the lowest shaft being placed 300 feet from the ...eam, on the opposite side of which the rock rises to the surface, form-...g steep cliffs. The water was raised to within forty feet of the sur-...e, when it was discharged into an adit 3000 feet long, which was ...o used by other claims. There were two pumps, ten inches in dia-...ter, the power being supplied by an eighteen-foot breast-wheel. This ...ll not, however, represent the total volume of water pumped, as the ...ound of this claim was partly drained by others lower in the series, ...which work could not be carried on till late in the season. In ...tober of 1876 the following companies on Lightning Creek were ...ving their pumps day and night, the Van Winkle being the only ...ne clear of water:— Water pumped.

Costello Claim.—Pump, twelve inches diameter, nine-foot stroke, ...king ten strokes a minute.

Vulcan Claim.—Pump, twelve inches diameter, six-foot stroke, ...king eighteen strokes a minute.

Vancouver Claim.—Pump, twelve inches diameter, nine-foot stroke, ...king ten strokes a minute (double acting).

Van Winkle Claim.—Pumps, ten inches diameter, fourteen-foot stroke, ...king ten strokes a minute (two pumps).

The quantity of water being raised at this time would, therefo amount to about 13,870 gallons a minute, or 19,874,000 per diem.

In many cases the machinery and appointments used in mining the deep channel were very creditable, and almost the whole of t work was paid for by the miners of the district itself. Money gair in one enterprise was usually invested in another, and the share-hold in a mine were frequently to be found themselves at work in it.

Length of working on deep channel.

On Lightning Creek, the old deep channel has been followed a worked out to a length of about 16,000 feet in all, and in additior number of rich bench claims and tributary creeks have yielded gc returns. In endeavoring to 'bottom' the old channel further do the valley, very great difficulty is encountered, in consequence of t quantity of water and the increased depth of the sinking requir The Eleven of England is the lowest claim in which the old chan has been reached, and though evidence was here found, in the fi character of the gold, of increasing distance from the main sources supply, it is probable that still lower portions of the valley may proved to pay, with improved facilities.

Yield of claims on Lightning Creek.

It is impossible to present complete returns of the amount of g obtained from the old bed of Lightning Creek, but the following appro mate statement to November 1st, 1875, published in the report of t Minister of Mines of British Columbia for 1875, is still of interest showing how large this amount, in the aggregate, must have be The claims are here arranged in their order following down the creek

Campbell and Whitehall	$200,000
Dutch and Siegel (now Perseverance)	130,000
Dunbar	30,000
Lightning	153,962
Discovery and Butcher	120,000
South Wales	141,531
Spruce	99,908
Point	136,625
Van Winkle	363,983
Victoria	451,642
Vancouver	274,190
Vulcan	56,955
Costello	20,476

It would probably not be an exaggeration to state that the de channel, for the portion of its length above referred to, with the ad cent side ground worked at the same time, has yielded through gold to the value of over $200 to the running foot.

Williams Creek

On Williams Creek, on which the towns of Barkerville and Richfi are situated, the chief workings have been in a space of about two mi and three-quarter in length. In this the deep channel has been work

ugh, and also as much of the side-ground as would pay at the time hich the mining took place. Many of the lateral creeks and gullies have paid remarkably well; and the hill-sides, in some places to a ht of a hundred feet or more, have proved to be sufficiently rich he hydraulic method of working, which is now profitably carried Though Williams' Creek has produced in the aggregate the greatest nt of gold, Lightning Creek showed for a time a larger annual d.

Ground above and below 'The Cañon.'

he Cañon' between Barkerville and Richfield divides Williams k into two parts. For about half-a-mile above it, the ground was ow, and has been worked open to the bed rock. Further up, deep ing was practised in former years and hydraulic work is now carried Below 'The Cañon,' all the work has been deep, in the old channel. ugh 'pay streaks' were sometimes found after getting down t twenty feet, these were usually disregarded in early days. In Cameron claim, however, half-a-mile below Barkerville, the dirt nearly to the surface, and was worked in stages from below after old channel had been cleared out. The workings were about sixty deep at Barkerville, only thirty-five feet at the former site of eronton, and at the Ballarat claim,—three-fourths of a mile below erville—eighty feet. This is one of the lowest claims in which old channel has been bottomed, and most of the gold obtained was t and scaly. The valley is here wide, the present stream turning

Lower part of valley.

ptly to the west, while a wide, low hollow, known as Pleasant ey, runs off in the opposite direction, to Antler Creek. It is sup- d by many, that the main channel of the ancient water-course turns n this direction, but owing to the great quantity of water and e character of the ground, neither this nor the present valley of liams Creek below the Ballarat, has yet been proved, though much ey has been expended in the attempt. The Lane and Kurtz Com- y went to great expense in importing machinery and erected very plete works some years ago, but did not succeed in proving their nd, and have since abandoned the attempt. The place at which work was carried on is known as 'The Meadows,' the valley here ning out and becoming wide and flat-bottomed. The Company held ncession covering about four miles in length of the valley, but suc- eled in reaching a depth of 125 feet only, and in drifting out found they were still too high for the deep channel, while the volume of er was greater than their pumps could master.

'The Meadows.'

Yield of various claims.

s shewing the great local accumulation of gold in the deep channel Williams Creek, and indicating its local origin, the following proximate statement of the value of gold obtained in various claims, ering certain lengths of the channel, is important. All these claims

were below 'The Cañon,' but they do not form a consecutive series, such details being available for many other claims.—

Adams	100 feet.	$ 50,000
Steele	80 "	120,000
Diller	50 "	240,000
Cunningham	500 "	270,000
Burns	80 "	140,000
Canadian	120 "	180,000
Neversweat	120 "	100,000
Moffat	50 "	90,000
Tinker	140 "	120,000
Watty	100 "	130,000
	1340 "	$1,440,000

Prospects for further work on Williams and Lightning Creeks.

In Cariboo district, even to the present time, the prices of labo and supplies have never been lowered to a point at which it would profitable to work any but the richer deposits, which in the nature things bear a small proportion to those capable of yielding a moder or small amount of gold; and in working over the deep ground in ea days much was left that would even now pay handsomely, but cann be found or reached on account of the treacherous nature of the mov ground, filled with old timbering and water. On both Williams a Lightning creeks, but particularly in the former, there must be a gr quantity of gold in ground of medium richness even yet. To ren this gold available, however, and to prove successfully the lower a more difficult parts of the valleys, greater and more exact engineeri knowledge, better and larger machinery, and, above all, cheaper labo and supplies, dependent on greater facilities of transport, such as wo result from railway connection, are required.

Bed-rock Drain and Flume.

The most important works of a general kind which have so far be carried out in Cariboo district are the Bed-rock Drain and Bed-rc Flume, on Williams Creek. The first of these is a tunnel which ru through all the old deep workings, beginning at the lower end of t part of the creek called 'The Cañon' (about 1000 feet above Bark ville) and running out in 'The Meadows.' The total length of t tunnel is about one and one-eighth mile, and the cost of its constr tion is estimated at about $100,000. The Flume, constructed in 18 begins about 1000 feet above the head of the Drain, at the upper e of 'The Cañon.' It is a cutting averaging about twenty feet in dep and a mile in length, and is estimated to have cost about $250,0 Into it the small flumes of the various companies working along t creek discharge, and it has also served for the working of the grou belonging to the Flume Company. By means of the free draina

ded by these works, a great part of the later mining has been nered possible.

an illustration of what might be done in this way, it may be tioned, that it has been suggested, that by cutting a flume to Antler ek — part of which would require to be a tunnel — free drainage of whole upper part of Williams Creek would be obtained, and if grade should prove to be sufficient on survey, it would enable the y from its sources to the flume level, with all its old workings, and great depth of tailings holding more or less gold which has accu-ated, to be completely stripped by extensive hydraulic works. Possible flume to Antler Creek

the above general notes on Cariboo district, Williams and Light- creeks have been particularly referred to as exemplifying the itions there found, and the methods employed in working the old channels. These two creeks have, besides, yielded by far the ter quantity of the gold, and on them the pre-glacial channels have found to be continuous, and though deep, specially well adapted working. Underground drifting on old channels has, however, practised, as well as several other creeks, of which Keithly, vey, Grouse and Mosquito creeks may be specially mentioned. re are besides a number of creeks which have yielded much gold by ace work or in open sinkings of moderate depth, portions of which remain, which it is confidently believed by miners would prove in deep ground if properly explored. Antler, Cunningham, Jack-of-Clubs creeks with Willow River are supposed to be ially promising from this point of view, and though attempts have made from time to time to test the deep ground on several of e, it has not yet been successfully accomplished. On Antler Creek, particular, the Nason Company has been at work with this object a number of years, and has not yet abandoned the efforts. Unproved deep ground on other creeks.

roximate statement of value of gold produced by Cariboo District, from 1874 *to* 1888. * Gold yield of Cariboo district

1874 (partial)	$ 700,000
1875	1,075,237 †
1876	646,000
1877	411,402
1878	380,535
1879	500,000
1880	564,000
1881	610,737
1882	471,525

rom the Reports of the Minister of Mines of British Columbia.
ossibly too high. Lighting Creek was, however, yielding well in this year, and was esti-d to have produced $500,000 of this amount.

1883	457,787
1884	423,855
1885	347,700
1886	288,300
1887	247,673
1888	250,377

Remarks on yield.

The amounts above assigned to the various years are merely appro imate, particularly for the earlier years of the series, the returns which are extremely imperfect. The table as a whole, however, ill trates the large amount continuously afforded by the Cariboo distr from a period beginning more than ten years subsequent to its d covery and after the most productive years had passed. It also e dences the gradual falling off in yield, which has been nearly contir ous since the richer portions of the deep channel of Lightning Cre has been worked over.

Similkameen, Rock Creek and Okanagan.

Having given in the preceding pages a somewhat full outline of t general mode of occurrence and working of the gold-placers of Caribo which are the most important in the Province, the remaining place mining regions must be very briefly noted, reference being made f such special particulars as appear to be of interest to the list of loca ties on subsequent pages. The general features of the various distric though here given in connexion with placer-mining, may also be refe red to in connexion with vein-mining in the same localities.

Physical characteristics.

The Similkameen, Rock Creek and Okanagan region includes some the first discoveries of gold in British Columbia, and has never sin been entirely abandoned, though the amount of work carried on h fluctuated from year to year. This region stretches across the interior the Province, and includes on one side streams rising in the inner flan of the Coast Ranges; on the other, valleys which penetrate t western edge of the elevation of the Gold Ranges. The physic characteristics met with in this wide stretch of country are ver varied, including mountains and plateau country with extensi wooded tracts penetrated with difficulty, but also some of the lowes warmest and most arid valleys of the Province, like that of the Sim kameen itself. The most notable portions of the region in respect

Localities of coarse gold.

the occurrence of 'coarse' gold, of evidently local origin, are Grani Creek and Tulameen, Rock Creek and vicinity, Cherry Creek ar Mission Creek. Elsewhere the gold is generally 'fine,' and is chiefl obtained from river-bars and flats, or from low benches. The most i teresting features in the region are, the late resumption of gold minin

a somewhat extensive scale on the Tulameen, the recent discovery (1885) of rich deposits of 'coarse' gold on Granite Creek, an inconspicuous stream, passed by hundreds of prospectors in early years; the transference of attention from the more or less completely exhausted placers of Rock Creek and Cherry Creek to the development of veins containing the precious metals, in the same vicinity, and the occurrence in very considerable quantities throughout the Similkameen district of platinum, alloyed with other related metals. On these points, further details are given elsewhere. It may be added here, that no part of this region is now so remote from means of communication as to cause serious difficulty in the development of any really rich metalliferous deposits, and the adoption, where circumstances warrant, of improved methods of placer-mining on a large scale. Features of interest. Platinum.

No reasonably complete returns of the annual gold yield of the region were spoken of exist, in consequence of the desultory character of most of the mining, and the various channels by which the gold obtained found its way out of the country. Since the resumption of activity on the Upper Similkameen, consequent on the discovery of Granite Creek, the returns for that part of the region are given as below, in the reports of the Minister of Mines of British Columbia. Of the entire yield stated, Granite Creek itself has contributed $383,000.— Gold yield.

1885	117,500
1886	203,000
1887	128,000
1888	105,000
Total	553,500

Kootanie and Big Bend.

Disregarding numerous less important and scattered localities of gold-mining, the remaining districts which have acquired celebrity from this point of view, align themselves, with that of Cariboo, on that member of the Cordillera system, which has been described under the name of the Gold Range. The Kootanie region, including under that general term the somewhat distinctly separated Big Bend country, extends from the International boundary north-westerly to the Great Bend of the Columbia, with a length of 246 miles. It is, for purposes of description, also regarded as including the adjacent western slopes of the Rocky Mountains proper. Wild Horse, Perry, French, McCullough and Carnes creeks may be mentioned as the most productive, though there are also many less noted localities, and a great number of streams which have as yet been little, if at all prospected, though Principal localities of mining.

favourable in appearance. The mines of Wild Horse Creek ha proved the richest in this region, though confined to about two mil in length along the valley of that stream. They were develop early in the history of gold-mining, and have ever since produced considerable annual yield. Nearly all the other streams which ent the Columbia-Kootanie valley are known to hold more or less gold, ar river-bars have been successfully worked along the Columbia and places on the Kootanie. The discovery within the last few years paying ground on Porcupine, Cañon and Quartz creeks, shows tha the possibilities of this region for placer work are as yet by no mea exhausted, and the resumption of work on Carnes, French and McCu lough creeks, since the opening up of the country by the railway, bea similar evidence.

Physical characteristics.

With the exception of some considerable tracts of fertile and partl open country along the lower valleys, the greater part of this region extremely mountainous. It is generally well wooded, often bearin fine timber, but it is penetrated with difficulty, and much yet remai to be done in the way of prospecting before it can be considered t have been even fairly run over in search of placer mines. There good evidence, in several places, of the existence of rich, deep ground i the valleys of creeks partly worked in former years, and some attentio is also being paid to the initiation of hydraulic work on a considerabl scale. The climate in the lower valleys enables a prolonged workin season to be obtained on the placers. The rough character of th country, with the circumstance that neither the Columbia nor th Kootanie is continuously navigable, renders many parts of the regio very difficult of access, and up to the time of the opening of the Can dian Pacific Railway, communication with it was almost entirel maintained from the south, a comparatively small portion of the gol yield finding its way to the banks in Victoria, and therefore not appea ing in the returns, though it may be supposed to be covered by th amount allowed for as not recorded. The recent developments of vei mining in this region are elsewhere alluded to.

Gold yield of Kootanie district.

The gold-yield from 1874 to 1888 from the Kootanie district (nomi nally including also the Big Bend country, though except in the late years covered by the return, no mining of consequence was actually i progress there) is given by the Minister of Mines of British Columbia as below.—

1874	$50,000
1875	41,890
1876	25,000
1877	37,000
1878	25,400

1879	19,000
1880	19,500
1881	25,000
1882	29,500
1883	29,100
1884	60,826
1885	76,650
1886	58,500
1887	37,900
1888	47,612

Omenica District.

Next in order, on the line of the auriferous axis of the Province, and parated from the last-mentioned region by a considerable interval which no important gold-mining has yet occurred, is the Cariboo strict, previously described.

Still further to the north-westward along the same belt, beyond an terval in which the Gold Range can scarcely be traced, is the menica district, first entered about 1864, but scarcely developed l 1867. This district is situated near the 56th parallel of latitude d is in the drainage-basin of Peace River. The area within which e greater part of the mining has taken place is scarcely more than ty miles in greatest diameter, and includes the upper portions of rmansen, Omenica and Mansen rivers and their tributaries. This area described as being hilly rather than mountainous, and is nearly every- here covered by the dense northern forest. A very high opinion was first formed by miners of the Omenica district, but when the Cassiar coveries occurred, it was nearly abandoned. In 1879, it was re- cupied by about fifty-seven Whites and twenty Chinese, and Vital, rmansen, Mansen, Black Jack (a tributary of the last) Slate and st creeks were being worked; but the richer known localities having en since worked over, the mining has gradually dwindled to very all proportions. In 1887, only twelve Whites and about eighteen dians are known to have been at work, and the gold produced is imated at $13,000. Much 'coarse' gold was obtained, but the dig- ngs were generally complained of as being 'spotted' or irregular. his district is practically the most remote and inaccessible in the Pro- nce, the cost of supplies has always been excessive, and the difficulties the way of enterprise in the form of exploration thus very great. wide area of promising country in this region, therefore, remains tried. The head-waters of Finlay River have always been considered rticularly promising, from the fact that good 'prospects' of fine gold e found in all the river-bars, some of which have paid well for work

Physical characteristics.

Mining.

Little 'prospected' region.

on them. The sources of the Nation River have also been favourabl spoken of, and the Misinchinca and other tributaries of the Parsni present all the appearance of gold-bearing streams, but so far as I kno have never been tested. The 'fine' gold which is found and has bee mined along the whole upper portion of the Peace River, has doub less been carried through the mountains by that stream, and is derive from the wide belt of dark, shaly and schistose rocks which runs alon the western flanks of the Rocky Mountains in this portion of the length.

Arquerite or silver amalgam

Considerable quantities of arquerite, a silver amalgam containin about eleven per cent. of mercury, have been found with the gol in scales and nuggets, in Omenica, particularly upon Vital and Silv Creeks. This metal is commonly referred to by the miners as 'silve with which its appearance is identical (see p. 73 R). Very promi ing deposits of highly argentiferous galena have been found in th vicinity of the placer mines in Omenica, but no attempt has so far bee made to work them. (See p. 73 R).

Routes to Omenica.

The miners reached Omenica by two principal routes, viz., wit pack-animals, by trail from Quesnel *via* Stuart Lake, and on foo across the Babine and Fire-pan Mountains from the Forks of th Skeena, the Forks being attained in the first place by ascendir the Skeena from the coast in canoes.

Gold yield of Omenica.

The gold-yield for the first and more prolific years of the Omeni district cannot be ascertained with any completeness, and even sinc the commencement of the annual government reports, a gap of thr years occurs, no returns being given for 1876, 1877 and 1878. Durir these years, however, the field was virtually almost deserted. Th following table is based on the government reports.—

1874	$38,000
1875	32,040
1876	no return.
1877	"
1878	"
1879	36,000
1880	45,800
1881	39,300
1882	25,330
1883	21,000
1884	12,000
1885	16,500
1886	17,600
1887	13,000
1888	no return.

Cassiar.

The Cassiar district, includes the most northern region of gold-ining in British Columbia, and some of the creeks which have been orked lie to the north of the 60th parallel, or northern boundary of e Province. Dease Lake, lat. 58° 30′, long. 130° may be considered as e central point of the district. This lake is the source of the river the same name, which is a tributary of the Liard, itself a branch of e Mackenzie. Gold had already been found and worked on the ver-bars of the Stikine for eleven years, when Thibert and McCullough, ming from the east, reached and discovered the richer deposits of the ard drainage-basin in 1872. The miners, who soon flocked into the strict, came by way of the Stikine River, though a route for cattle d pack-animals was also opened overland from Fraser Lake. Dease, hibert and McDame creeks and their tributaries have proved the chest, and a large quantity of gold has been obtained from them; ough the yield has, of late years, become comparatively inconsider-le. The region presenting identical or analogous characters with that rtion of it which has proved to contain these rich deposits, is very tensive, and much the same remarks which have been made in re-rd to the exploration of the Omenica district apply here also, ough the cost of living in Cassiar has usually been somewhat more oderate. The country is generally wooded and mountainous, and fficult to traverse, but a waggon-road or even a railway, might with-t difficulty be constructed from the head of navigation on the Stikine Dease Lake, and this will no doubt eventually be accomplished, as scoveries of veins containing the precious metals are confidently to anticipated. Argentiferous galena has already been found, and the ugh, unworn character of the gold on some of the creeks leads to the lief that its source might be ascertained without great difficulty. Coarse' gold is found locally on that part of the Stikine above Tele-raph Creek, and the circumstances appear to indicate the existence ere of an old channel, above the present river-level, but covered by assive flows of basalt of Tertiary age. (see p. 47 R.)

Chief localities of mining.

Region to be 'prospected.'

Difficulties have been encountered in this district from permanently ozen soil met with in mining, but when once the covering of forest d moss had been cleared off by fire these disappeared.*

Frozen soil.

The gold yield of the Cassiar District, from the commencement of ining to the present date, so far as known, is shewn in the fol-wing table, which, however, gives no returns for the earlier years of ining, when work was confined to the Stikine River.—

Gold yield of Cassiar.

* For further particulars on the Cassiar Region see Annual Report Geol. Survey, 1887. Part B.

1873	Not known.
1874	$1,000,000
1875	830,000
1876	556,474
1877	499,830
1878	519,720
1879	405,200
1880	297,850
1881	198,900
1882	182,800
1883	119,000
1884	101,600
1885	50,600
1886	63,610
1887	60,485
1888	43,325
Total	4,929,394

Yukon District.

This extensive region, situated to the north of the 60th parallel, an west of the main range of the Rocky Mountains, lies beyond th northern boundary of British Columbia, but in the continuation of th same metalliferous Cordillera belt, and is therefore naturally include in connexion with the Province. Gold-mining began here only i 1880, and so far has been chiefly confined to river-bar work, nearly al the long streams tributary to the Yukon having proved to yield mor or less 'fine' gold. The aggregate length of rivers upon which gol has already been found is almost unprecedented, and the field for pros pecting in search of richer deposits of 'coarse' gold is very extensive So far the only discovery and mining of 'coarse' gold has been upo Forty-mile Creek, in lat. 64° 30′. The country is wooded and in gene ral not extremely mountainous, and the rivers afford a means of trave in summer, though usually swift. Access to the country is, howeve difficult, being generally obtained by way of the Chilkoot Pass whic crosses the continuation of the Coast Ranges at the head of Lyn Canal.*

Great length of auriferous rivers.

Skeena River.

Gold yield of Skeena.

On the Skeena River, which reaches the Pacific near the norther end of the coast-line of British Columbia, placer-mining has bee carried on to a limited extent during the past few years. Lorne Creek is the most important auriferous locality, but gold has been found i

* For further particulars on this region see Annual Report Geol. Survey, 1887, Part B.

veral other creeks and gulches in the same vicinity. These are asily reached by canoe from the coast. The yield of gold, chiefly om Lorne Creek, is reported as follows.—

1884	$17,000
1885	18,000
1886	13,400
1887	5,280
1888	no return.

Vancouver Island.

In Vancouver Island, the only placer mining district of importance hich has been worked, is that of Leech River, some particulars re-ating to which will be found on page 141 R.

General Considerations Respecting Placer Gold-Mining.

Future of placer-mining.

Though the yield of the gold-placers of British Columbia is now ery much less than it was at one time, and shows at present a gradual ecrease, placer-mining still contributes substantially toward the pros-erity of the Province, and employs a considerable number of men. It s, moreover, to be anticipated that this form of mining may continue o be a feature in the industries of the Province for many years to ome, and it is quite possible that circumstances may occur which hall bring about a notable revival of mining of this kind. Else-here it is commonly observed that placer-mining has been the first tep toward vein-mining, not alone indirectly from the fact that the lacer work has drawn a population to the metalliferous regions, but lso directly by the actual tracing up of the gold first found in the lluviums to its original matrix. We cannot therefore afford to set his class of mining aside as a dead issue.

The future of placer-mining deserves consideration, particularly from he following points of view :—

Respective areas of rich and poor ground.

1. In each proved auriferous district, the poorer or less concentrated gold-bearing ground must necessarily greatly surpass in area that of he very rich deposits which alone pay for work with primitive appli-nces and with the cost of supplies and labour at high figures. Thus he cheapening of these essentials, produced by improved means of ommunication and by the settlement of the country, coupled with he attendant facilities for bringing heavier machinery and appliances nto use, will enable the profitable working of greatly extended areas. These considerations apply particularly at the present time to the region of country in the vicinity of the railway or connected with it by

easily travelled routes. By the construction of the railway a larg part of the Kootanie district, together with that bordering upon th lower part of the Fraser, has been opened up for work of this kind, an deserve particular attention. The hydraulic method of mining wi doubtless rank first among the means to be brought into use for th utilization of the poorer deposits. From this point of view, th railway has also, to some extent, changed the conditions in th Similkameen and Rock Creek country, and in the Cariboo district It has effected no change in regard to the Cassiar district, but a already noted, this district may, without great cost, be rendered easil approachable from the coast. The difficulties remain greatest wit respect to the Omenica district, and a number of outlying places o less importance.

Further prosecution of placer-mining in known localities.

2. Another point deserving consideration, is the further exploratio of the already known rich deposits of gold confined principally to th old buried channels of the streams. In reviewing the experienc already obtained in working these, we notice, in a majority of cases, tha it has so far been found possible to work lengths of from one to thre miles of these old channels only, and while, in some instances, it ap pears that the rich ground is not more extensive, in many there i good reason to believe that much more remains, capable of yieldin good returns, but which it has been found impossible to get at wit the appliances and means at command. There are also quite a numbe of valleys in which, though the bed of the present stream has prove rich, the deep ground or old channel has not even yet been reached or if reached, has not been satisfactorily tested. In all these cases i requires only more effective machinery and greater engineering skil to be brought to bear, to attain and work the deposits referred to, an it is likely that many of them will pay well when such means ca be applied at a reasonable cost. It is not improbable, for instance that thus treated, such localities as Williams Lightning, Cunninghan and Antler creeks in Cariboo might be found to yield great additiona amounts of gold, and whenever railway communication is provided fo the Cariboo district, they will at least be thoroughly tested. Othe methods involving extensive works with the same object, such as th damming or diversion of streams, and the construction of long, bed rock flumes or drainage adits, fall under the same head, and there can b no doubt that extensive works of this character will eventually be under taken in the Province with satisfactory results.

New discoveries.

3. The discovery of important new gold-bearing creeks is still to b anticipated from time to time. The small portions of the lengths o individual streams which have been found to contain great quantitie of gold, is alone sufficient to show how easily such localities may b

ssed or passed over in a rough mountainous country of great extent. anite Creek and Coyooh Creek afford definite cases of this kind, the st discovered only in 1885, the second in 1886, and both in parts of e country which have been more or less thoroughly over-run by mies of prospectors for the past twenty-five years. The tracts which ve been slightly or scarcely at all examined, even those situated on e line of the auriferous range, are very extensive, and in the Yukon strict, to the north of British Columbia, the prospects for discovery this kind appear to be most favourable, and are still almost limit-ss.

Probable existence of older placers.

4. Not the least important consideration, however, from the point view of placer-mining, is that of the probable existence of placer posits differing in age and character from those which have so been worked in the Province. The rich deep leads of Cariboo idently date from a period antecedent to that in which the country as for a time covered by a great ice-mass, or are, in other words, e-glacial, and lie beneath the boulder-clay and other deposits due to e 'ice age.' The wearing down of the country-rock and natural ncentration of gold had been in progress from the close of the iocene or Middle Tertiary period (or perhaps in some localities en from an earlier date) to the glacial period. During the period the Middle Tertiary, a great part of the Province included between e Coast Ranges and Gold Range became occupied by fresh-water kes. These covered and by degrees filled up with their fine sedi-ents, whole systems of drainage which had been produced during rly Tertiary time; and into the lakes themselves, during the period their existence, streams from the surrounding mountain regions scharged, forming gravel-beds, which are particularly abundant the base of the finer deposits. Toward the close of the Middle rtiary, extensive volcanic action occurred, producing the basalts d other igneous rocks which still overlie the greater part of the ea of the old Tertiary lakes. Denudation which has gone on nce this time, has locally removed considerable portions of these iddle Tertiary deposits, and has cut new valleys in them, and there

Character of Tertiary deposits and Tertiary placers.

Modern placers

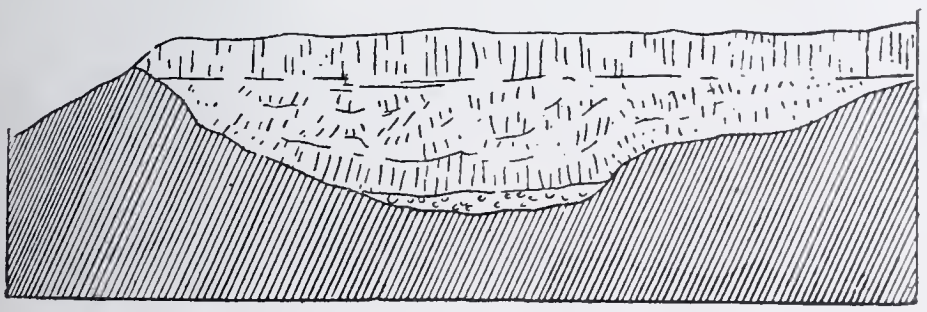


Fig. 2. Section on the Stikine River, above Telegraph Creek, shewing basalts filling a pre-Miocene valley and overlying the old river-gravels. From Annual Report Geol. Surv. Can., 887, p. 71 B.

is reason to believe that some of the modern placer deposits have be enriched more by the robbing of these old, early and Middle Tertia gravels than directly from the wearing down of the original rock

Places where ancient placers may be found.

Whenever, therefore, these old Tertiary gravel-beds or congl merates exist in the vicinity of the known auriferous districts, the well deserve careful examination, though, so far as I am aware, none them have actually been worked as yet in the Province. In such loca ties for example as Mission Creek, the South Similkameen and Whip-sa Creek, recent auriferous gravels rest upon the worn surface of Midd Tertiary rocks, consisting of soft argillites, shales and sandstone These rocks are generally known to the miners as 'false bed-rock,' ar it is highly probable that if they were sunk through to the bottoms the still older valleys in which they lie, rich gold-bearing gravels conglomerates might be found.

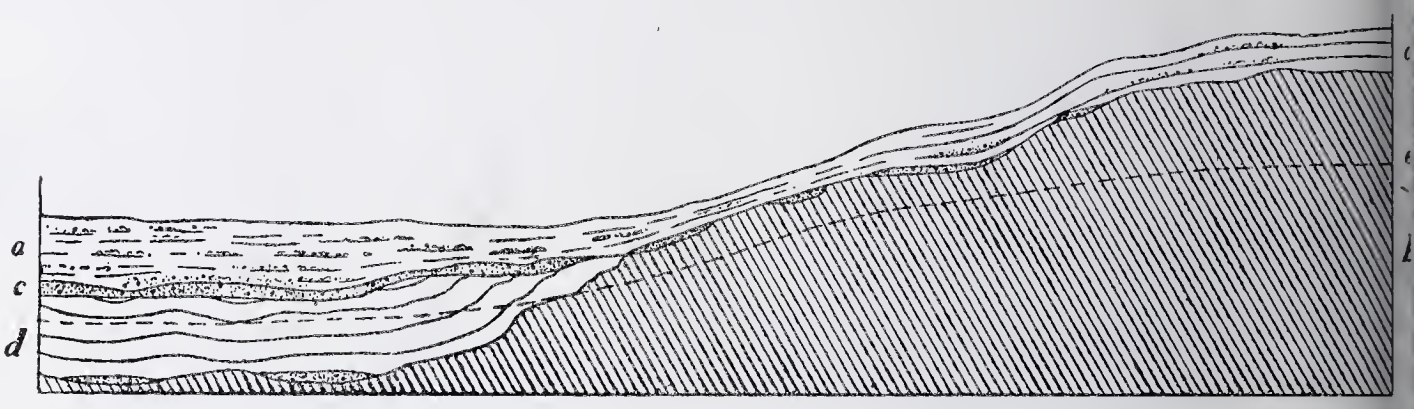


Fig. 3. Diagram representing mode of occurrence of gold on Mission Creek. *a*. Rece gravels. *b*. Crystalline rocks. *c*. Auriferous gravel. *d*. Tertiary beds, shewing the possi occurrence of underlying Tertiary placer-deposits. *e*. Line representing present bed of strea From Report of Progress, Geol. Surv. Can., 1877-78, p. 157 B.

Mission Creek.

The accompanying section, reprinted from my report of 1877-7 illustrates the known mode of occurrence of gold on Mission Creek an the possible existence of old Tertiary gravels in that vicinity.

Probability of Cretaceous placers.

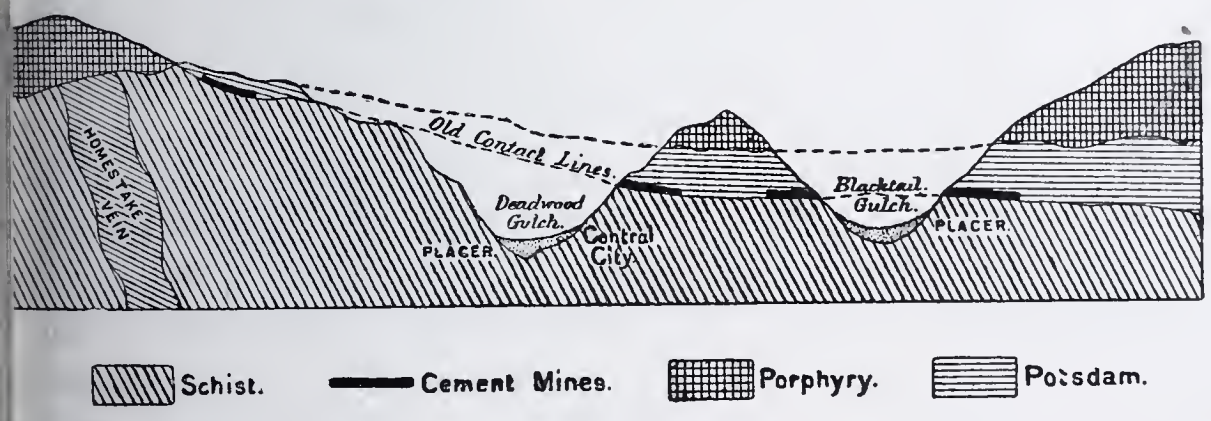
It is further probable that gravels dating from periods still earli than the Tertiary, and now consolidated into conglomerates of varyin degrees of induration, may be found to contain gold in remunerativ quantity. Allusion has already been made in this connexion to th Cretaceous conglomerates of the Lower Fraser (p. 29 R), and simil conglomerates are also known to occur in great mass near Tatlayo Lake and the head-waters of Bridge River, on the Quesnel Rive and elsewhere. It may in fact be affirmed, that all gravel-beds conglomerates of whatever age, occurring in or near the auriferou regions, are worth examination for gold, and particularly so when the are found directly in contact with the surface of the still older rock which constituted the 'bed-rock' at the time of their formation.

he gravels and conglomerate deposits of the Middle Tertiary, often a distinct relation to the modern valleys in the more mountainous ricts, in which the main outlines of erosion have been nearly con- t from a very early period, but in the wider and lower parts of the rior Plateau, great areas are covered by nearly horizontal flows of lt, beneath which, should old auriferous stream-beds exist, they only be traced by underground work or by boring, in the man- adopted at Ballarat and elsewhere in Australia and in some places alifornia. Since the period of deposition of the still older Creta- s conglomerates, the surface of the country has suffered so many ges, including among others the elevation of the Coast Ranges, these conglomerates now bear little or no relation to the present nage systems.

Relation of placers of different periods to physical features.

he considerations above stated are not merely of a theoretical char- r, but are warranted by experience gained in other regions. The buried placers of California (which Prof. Whitney believes to have in process of formation by erosion continued throughout nearly entire Tertiary peiod), and those of Australia, are so well known to t gold-miners as to require no more than mention. It is not so rally known, however, that conglomerates of Carboniferous and Carbonifero-Permian age have been worked for gold in New-South- es, and in Queensland (as at Peak Downs) and that gold in greater ss quantity has been found in conglomerates of the Carboniferous od in Nova Scotia (at Gay's River), and in France. Of still greater rest, in the same connexion, is the existence of gold in the Potsdam glomerates of the Black Hills in Dakota, where these rest upon the ace of certain still older schistose rocks which contain auriferous tz-veins. Regular mining operations have been conducted in e conglomerates, and they have been found to be, locally, ex- ely rich. Mr. Jenny states that there are four distinct ages of

Instances of ancient placer deposits.



4. Section in the Black Hills, Dakota, shewing the mode of occurrence there of ancient lacers in conglomerates at the base of the Potsdam sandstones, and the manner in which have served as a source of supply of gold for newer placer-deposits in valleys subsequently d by erosion. From paper by W. B. Devereux in Trans. Am. Assn. Mining Engineers, Vol. 68.

gravel formations in the Black Hills: —(1.) Potsdam, (2.) close Tertiary, (3.) close of Glacial period, (4.) recent, and that all of th have proved to be auriferous, except the third. The accompany section will illustrate the mode of occurrence of the 'fossil place of the Potsdam in the Black Hills, and the formation of recent plac secondarily from these, better than any description.

The auriferous Potsdam conglomerates are very compact, and requ to be milled and treated like auriferous quartz, and the same may be s with respect to some of the old conglomerates or 'cements' of V toria and of New Zealand. Some of those in Victoria are, howev stated to have yielded an average of twelve ounces of gold to the to

Connexion of Placer-Mining and Vein-Mining.

Intimate relation of placers and gold-ores.

The transition from placer-mining to 'quartz-mining' is an e one. The richer and more easily reached placers are, as a rule, s worked over, and it then becomes natural to enquire as to the source these old concentrations. The consequent change of the centre of terest has already occurred in most parts of California and in Austra but British Columbia is still in the transition stage in respect to g mining. Save in a few exceptional cases, the occurrence of 'coar or 'heavy' gold in the old channels, may safely be accepted as pr ing that the original source of the gold is not far off. The distance which 'coarse' gold travels is, as a rule, very inconsiderable, even in beds of rapid streams. Additional evidence to the same effect is genera afforded by the varying assay value of the gold found on differ creeks or even on different parts of the same creek, and this is of emphasized by the rough unworn character of the gold and the c cumstance that it not unfrequently still holds imbedded fragments quartz. It is from this point of view in particular, that it is most i portant to note and preserve a record of the observations made by t placer-miners in the course of their work, even where the deposits not any longer continue to be remunerative.

Conditions in California.

Speaking of broad areas in California and Australia, where work both kinds is in progress, it may be affirmed that the rich placer d tricts coincide with the rich quartz districts throughout. Innumera special cases might be cited, if it were necessary, to shew the exc tionally rich local deposits of placer-gold depend on the occurrence notably rich quartz-veins in immediate and clear relation to the and in the fact that extremely rich localized placers have been fou

* See, in this connexion, Ore Deposits, J. A. Phillips, pp. 232, 459, 508, 602; Mineral Wea of Queensland, 1888, p. 25; American Inst. of Mining Engineers, vol. x, p. 466; U. S. Te Census, vol. xiii, p. 90.

ny parts of British Columbia, and particularly in the Cariboo t, we find justification for the belief in the future of 'quartz- g.' It is true, that in some instances the natural concentration gold derived from the wearing away of a great mass of com- vely poor rock, may give rise to rich placer deposits, or that the from which the gold has been derived may be too irregular in ss, or too much broken, to be profitably worked themselves; but exceptions cannot be regarded as negativing the general rule. The emains that a large proportion of the mines of precious metals in rnia and in Australia have been discovered by tracing the deposits of gold to their sources. Placer deposits derived from mstock lode were worked for ten years before the lode itself was ered, and when found and opened, it proved to be essentially a silver mine in which gold occurred in relatively small quantity. same way, the working of placer deposits preceded the dis- y of the now celebrated Treadwell mine in Alaska, and the 'pro- ' is justified in following up this clue wherever he can find it.

Placer deposits indicative of auriferous quartz.

General Remarks on Vein-Mining.—(*Precious Metals.*)

Gold.

conditions of occurrence of workable auriferous lodes in British bia, yet remain to be studied in detail and discovered as the de- ment of mining of this kind progresses. It may, however, be from what is already known, that while not confined to rocks of lass, the more important gold occurrences are usually found in xion with areas of argillite-shales and schists, commonly of dark rs, and often more or less distinctly carbonaceous. Further, that in certain parts of the extent of these argillite rocks have really placer deposits been found, a fact depending apparently on the rence locally of quartz-veins traversing them, and also, possibly, e existence of igneous intrusions or other peculiar circumstances, remain to be ascertained. So far as these generalizations ey correspond with those already arrived at in California, saving n British Columbia the argillaceous and schistose belts referred to, r to belong to several geological horizons widely separated in of formation, as already noted. The accessory local causes which resulted in the deposit of gold in veins, etc., appear to be found frequently in and near the Gold Ranges.

Occurrence of gold in British Columbia.

Comparison with California

ile it is not possible here, even if it were necessary, to enter into general discussion of the features and principles of the mining and ment of ores of the precious metals, it may be useful to those now

interested in the discovery and development of such deposits in Province, to note very briefly a few important points bearing on subject and dependent on recent investigations.

Tendency of recent mining.

As showing the general tendency of recent mining, and for the pose of directing attention to the larger deposits of low-grade ore can not do better than quote the following judicious remarks of Clarence King, who writes:—"It may be said that the richer and p ores which were sought for in the early days of mining, have l gradually giving way to those of more complicated nature and ge ally of lower value in the precious metals. Consequently in the duction processes we find smelting acquiring a relatively more portant place than it formerly held, and in milling an increasing u dry crushing processes connected with subsequent roasting of the and a marked growth of the lixiviation process."*

Low grade gold-ores.

A particular instance of the treatment of low grade gold-ore oc ring in great mass, of special interest to British Columbia on acc of its proximity, is afforded by the Treadwell mine in Alaska; profitable working of which, upon a large scale, is rendered possible by the great advance in modern appliances and methods of treatm Further important evidence to the same effect is afforded by the res of recent mining in Australia and in the United States. From

Australia.

Government Mineral Statistics of Victoria for 1887,† we learn that average yield per ton in that year was 9 dwt. 9·95 grains only of g (0·471 oz.) the quantity of quartz treated being 780,733 tons, w the Ballarat district, one of the most important, yielded an averag only 7 dwt. 23·57 grains (0·399 oz.). Since the first publicatio mineral statistics in Victoria, particulars have been obtained resp ing 23,386,935 tons of quartz, the yield of gold from which avera 10 dwt. 11·09 grains (0·523 oz.). The cost per ton for crushing al varied, in 1887, from 15s. to 4s. 6d.

California.

In certain localities in California, where the ore can be quarried ra than mined, under specially favourable circumstances, gold-bea quartz yielding as little as $1 to the ton is reported to have b profitably worked.

For the purpose of further illustrating the class of gold-ores wh may be worked with profit, the following tabular statement represen certain well known and largely productive mines in California and in

Dakota.

Black Hills of Dakota, has been compiled. The first four mines y free-milling ores, the last a sulphuret ore with only a certain pro tion of free gold.‡ The figures for the two first mines and the fou refer to the year 1885. Those for the third to 1884-85, and those the fifth represent the average work for four years, 1881-84.

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* U. S. Tenth Census, vol. xiii., p. xii.
† Mineral Statistics of Victoria for the year 1887. These figures refer to the ton of 2,240 lb
‡ See Hamilton Smith in Mining Journal, London, 1886, vol. lvi, part 2, p. 857, and T Carning, in Engineering and Mining Journal, N.Y., 1886, vol. xlii, p. 419.

Mine.	Quantity of ore treated.	Mining.	Milling.	Management, etc	Total cost.	Total yield.	Profit.
	Tons.	$	$	$	$	$	$
ı Buttes, Cal.....	54,479	4.06	0 56	1.21	5 83	6.98	1.15
as Eureka. Cal.....	56,052	4.36	0.61	0.60	5.57	7.60	2.03
estake, Dak.....	213,190	Total cost per ton, mining, milling, etc..			3.25	5.73	2.48
er de Smet, Dak.....	106,855	" " " ..			2 12	3.57	1.45
Mine, Grass Val., Cal.		Average cost of mining, milling, etc.....			8.97	18.59	9.62

is of great interest further to observe, as the result of discoveries investigations made within the last few years, that in endeavour- to trace out the sources of placer-gold and discover workable gold-, attention should not be too exclusively given to quartz-veins alone. ile the greater part of the known gold-ores belong to the class of rtz-veins, it is now found that gold occurs also in payable quantity nany other associations. Gold-ores of various kinds other than 'quartz.'

has long been recognized that certain belts of rocks containing nerous small and irregular quartz stringers only, will pay for mining crushing as a whole, and where, as in Cariboo, there is reason to be- e that the larger known veins can scarcely be looked upon as the sources of the 'coarse' gold of the placers, such quartzose belts ountry-rock may well be sought for and tested. In Queensland, toria and New-South-Wales, Mr. Daintree and others have been able rove, not only that there is an association between the paying rtz-veins and the vicinity of the occurrence of certain intrusive eous rocks, but also that in these intrusive rocks and notably in tain pyritous diorites, gold occurs in some instances in such quantity o have produced paying placers by their decomposition. Similarly, Colorado, between South Park and Blue River, Prof. J. J. Stephen- describes certain dykes of compact trachyte and Silurian and Car- iferous quartzites as the sources of the placer gold which has been ensively worked there, though not themselves containing gold in able quantity. Peculiar occurrences of gold. Queensland. Colorado.

n further evidence of the wide distribution of gold, it may be added, t in North Carolina, Prof. W. C. Kerr notes the following rocks as ng there auriferous. In Morse County, a mine which yields its d mainly from felspathic schist. In the famous King's Mountain ne the gold is obtained not only from certain seams of quartz, but o from a sixty-foot bed of schistose limestone, which is quarried out ily and sent to the stamps. Gold is also found in paying quantities quartzite-schist and quartz-slate, and in "grey much jointed rtzites and felsites of the Huronian hills on the eastern side of the North Carolina.

great slate belt" of North Carolina. From these facts Prof. Ke
led to conclude that, "gold is so widely diffused that we may expe
find it in any kind of rock."

Mount Morgan deposits.

The Mount Morgan gold deposit of Queensland, which is the
important recently discovered, illustrates still another peculiar oc
rence of exceptionally rich gold-ore. The gold is here found minu
disseminated in a mass of brown and red hæmatite and siliceous sin
which has apparently been produced by a former thermal and gey
like spring. The gold-content of this material is no less than about se
ounces to the ton and at present 1500 tons a week are treated. F
ments of richly auriferous rock resembling that of Mount Morgan h
been found at Clinton, in British Columbia, but have not yet b
traced to their source.

Treadwell Mine, Alaska.

I am not aware that any systematic description has yet been p
lished of the Treadwell mine of Douglas Island, Alaska, but from
examination of it which I was able to make in 1887, I may say t
the rock there worked appears to be nothing more than an upper p
or edge of a great granitic dyke or intrusion, which has broken thro
the black, slaty argillites of the region, and has been subjected to ex
sive hydrothermal action, produced either by emanations from
granite mass itself, consequent on its relief from pressure on approa
ing the surface, or subsequently to the intrusion of the granitoid r
by independent agency. This action, however brought about,
entirely decomposed whatever mica or hornblende the rock may h
originally contained. It has also, to a great extent, decomposed
felspars and has charged the whole mass with quartz of second
origin, which sometimes takes the form of minute stringers, but m
generally spreads itself uniformly in the decomposed rock-material,
is associated with small crystals of auriferous iron pyrites and min
quantities of free gold. The same hydrothermal action which
caused the decomposition of the edge of the granitic intrusion,
evidently produced the quartz-veins found to penetrate the adjac
slaty rocks; which veins, in the neighboring "Silver Bow Basin,"
found to hold gold in distinctly visible particles and small nugg
The rock-formations met with on the part of the Alaskan coast wh
this mine is situated, being identical with those of the coast region
British Columbia, to the southward, it becomes important that
similar contacts of rusty or pyritous granitoid rocks with the argillit
should be examined and assayed, as it is not improbable that furth
deposits of the character of the Treadwell mine yet remain to
discovered there.*

* On peculiar modes of occurrence of gold referred to in the preceding pages, consult Ore
posits, J. A. Phillips; Quart. Joun. Geol. Soc., vols. xxviii, p. 271, xxxiv, p. 431; U
Geographical Survey west of the 100th meridian, vol. iii, p. 423; Trans Am. Inst. of Min
Engineers, vol. x, pp. 340, 475; Mount Morgan Gold Fields, 1884; Mount Morgan Gold Depos
Second Report, 1889, R. L. Jack, Queensland, Government; Mineral wealth of Queensland, 18

Silver.

Respecting silver-ores in the province of British Columbia, it may stated, as the result particularly of the developments of the past years, that these appear likely to achieve importance even before se which are distinctively auriferous. There is every reason to ieve that before many years elapse the Province will take its place one of the great silver producing regions of the world, and it is ssible that silver may attain and continue to hold a greater import-ce than gold.

Definition of chief silver-bearing belt.

Characteristically silver-bearing ores have already been found in merous widely scattered localities. The greater number of these, wever, arrange themselves along the metalliferous belt which has eady been referred to as that upon which the most important cer-deposits of gold occur. Argentiferous galenas appear to be the st abundant ores, and the knowledge of these already attained is suffi-nt to enable us to trace this silver-bearing belt, from point to point, m the International boundary north-westward to the 60th parallel latitude (forming the northern boundary of the Province) and yond it to Forty-mile Creek, where the Yukon leaves the North-west rritory to enter Alaska. The belt thus defined has the almost exampled linear extent of about 1200 miles, and it may be said that nerever it has been explored and prospected (which has occurred nerally in connexion with work on gold-placers), highly argentif-ous galena ores have been found.

Discoveries in southern British Columbia.

The most considerable discoveries so far made, however, are those the southern part of the belt, and for the most part at no great stance from the Canadian Pacific Railway. These deposits, it is ir to assume, have been brought to light on account of the acces-bility of the region in which they occur; for nothing is known to ow that other parts of the same belt of country, when similarly ought within reach and examined, may not prove to be at least ually rich in such ores. Even in the district in which discoveries nd development are now being actively pushed at several centres, here is reason to believe that what has become known, bears but small proportion to that which remains to be found; for by far he greater part of this rough mountainous country is still un-xplored, or has been traversed only along certain routes, between hich are wide, untrodden and often densely forested and rugged acts. Thus, from every point of view, the discoveries made within very short time in this southern portion of the metalliferous belt, ust be considered as of the most encouraging character.

Modes of treating silver-ores and expense.

The principal modes of treating the various classes of silver-or depending on their composition, may be summarized as below :—*

Free silver, decomposed argentiferous ores or chloride minerals : Trea by free silver milling.
Silver ore, accompanied by sulphides of copper or other base metals : L grade, fine concentration ; high grades, roasting milling.
Argentiferous copper- or lead-ores : Coarse concentration and smelting.

A large proportion of the ores found up to the present time in Briti Columbia, including nearly all those of the Kootanie region, belong the last-noted class. The expense of treating such ores must vary ve materially according to the cost of labour, fuel, etc., but may r from $15 to $25 a ton, and this the price of the metals in the ore mu be sufficient to cover after all the cost of mining, concentration a transport to the smelter have been charged against them.

Vein-Mining Districts (*Precious Metals*).

Classification of ore-deposits.

Under this heading, it is proposed to give a few particulars relating the various districts which have already attracted some notice on accou of the occurrence of veins containing gold and silver. Some of t deposits mentioned might with equal propriety be classed as lead-or or copper-ores, but when these contain the precious metals in workab quantity, it becomes more convenient to include them here. As it difficult to follow any regular geographical order, the Cariboo distric as being that in which the earliest attempts at 'quartz-mining' ha been made, is placed first.

Cariboo.

History of 'quartz-mining.'

The general features of the Cariboo mining region, have already bee referred to in connexion with its placer mines. Almost from the fir working of the placers, the existence of numerous quartz-veins wa noticed, but no particular attention was given to these till the yield alluvial gold began to be notably diminished. It was then felt, tha notwithstanding the remoteness of this district, the existence settlement and of a considerable mining population in it, justified th attempt to develop 'quartz-mining.' This feeling brought about th premature quartz excitement of 1877 and 1878, which was based o exaggerated ideas of the richness of certain known lodes, and on errone ous views as to the facility with which gold might be extracted fro the pyritous ores which these afforded. From the collapse of thi

* From the Mining Journal, vol. lix., p. 278.

citement, vein-mining received a severe check, but in spite of this couragement, the miners of Cariboo have not relaxed their efforts ward the development of vein-mining, their attention being, as is ly natural, almost entirely directed to gold-bearing quartz.

Eventual success assured

From what is known of the district, I can entertain no doubt that it destined to become an important vein-mining one. It has been de clear that in that part of the district in the immediate vicinity the rich placers, there exists a great number of well-defined quartz-ins, and while such small tests as have so far been made, shew that a jority of these yield low returns in gold, some are already known to ord encouraging results, such as to warrant extensive working if the gion were better provided with means of access.

Great number of veins.

The explorations of the miners have been assisted by the work (in 85 and 1886) of Mr. Amos Bowman, of the Geological Survey. In a eliminary report already published* Mr. Bowman enumerates nearly a ndred ledges and 'quartz prospects' visited by him, adding that se do not comprise probably half the number noted or a hundreth rt of the really good ledges which a prospector might find in the riboo country. These places are described in greater detail in his thcoming report on the district. Notwithstanding the absence of lway communication, the prospects of the establishment of an im-rtant 'quartz-mining' industry in Cariboo were never so bright as the present moment.

Group of promising veins

It is, of course, impossible to mention here all the very numerous alities in which ledges have been located or noted, or even to specify se upon which more or less prospecting and exploratory work has en done. These details will find a place in Mr. Bowman's forth-ning report. It may be stated, however, that Mr. Bowman con-ers the following groups or series of ledges as among the more mising ones known up to the present time, and apparently worthy of ecial attention :—

- Ledges between Island Mountain and Mosquito Creek, extending two miles. (Including "Walker," "Sadou," and "St. John's" or "Island Mountain.")
- Ledges near Williams Creek, from Lowhee divide to Proserpine Mountain, extending one mile and a half. (Including "Proserpine," "Stedman," "Big Bonanza," "Enterprise," "Victoria," and "Sam Crane.")
- Ledges at Burns' Mountain, Lightning Creek, entending half a mile. (Including "Perkins," "Burns' Mountain," and some of the Lightning Creek ledges.)
- Ledges crossing Grouse Creek. (Including "Dufferin" and "Fountain-head.")

* Report of Minister of Mines of British Columbia, 1886.

Ledges on Snow-shoe Plateau from Break-neck divide to French Snow-shoe Creek, extending about two miles and a half. (Including "Haywood" and "Arastra".)

Ledges crossing Hixon and Cañon Creeks. (Including "Washburne," "Stewart" and "Morrison.")

Table of assays

Reference should also be made to the assays from various veins giv elsewhere. (See p. 76 R.)

Transition from placer- to vein-mining.

While it is conceivable that extremely rich placer deposits, li some of those of the Cariboo District, might be produced by the we ing down and natural concentration of great masses of rock, throu which gold may have been very thinly scattered, or in which the g occurs merely in small and irregular quartz stringers, there is no p bability that such conditions are universal in the Cariboo distri The very 'coarse' character of much of the placer gold and t definite localization of the richer parts of the deposits here, shew th these must often be near their points of origin, and the problem n before the miner is that of ascertaining the sources of the gold, a discovering the rules locally applicable to the original deposits.

Points to be considered.

In connexion with this problem in Cariboo, I would invite attenti specially to the points alluded to in the general remarks on ve mining (p. 53 R) for the purpose of inducing an enlargement of t scope of the enquiry. It may also be mentioned that the very fact the 'coarse' character of much of the Cariboo gold, goes to shew th while gold may exist as well in paying quantities in a finely disse inated state, much of it must evidently occur very irregularly in t productive ledges, from which it may, therefore, be necessary to obta the average of a large quantity of rock before a conclusive test can l said to have been made. The existence of 'pay chutes' is a fa familiar to all miners, and has been found notably to characteri gold lodes in both California and Australia. Such chutes may for but a small portion of the natural outcrop of the veins, an addition circumstance calling for trials of lodes on a somewhat extensive sca before they can be affirmed to have been fully proved.

Relation of sulphurets to gold.

In the Californian gold belt, according to Mr. G. F. Becker, so ge eral is the association of gold with sulphurets, that where gold is n visible, miners, judge of the value of an ore by the quantity of s phurets it contains. Mr. Becker adds:—"Quartz with plenty of s phurets and no visible gold often occurs in large bodies, and is apt pay better in the long run than quartz with very coarse gold, 'specimen quartz,' as it is called by the miners."* While this ru seems to hold also to a considerable extent in Cariboo, particularly the association of gold in veins with iron-pyrites, it would appear,

* U. S. 10th Census, vol. xiii, p. 10.

ur as experience has gone, that it is either not so constantly the case, r that the proportion of gold in the pyrites is less considerable than n the gold belt of California. This and other similar points are, however, only to be settled by exploratary work and by working tests, and s several very strong pyritous lodes are already among those best nown, it will probably not be long before their character is fully scertained.

With the object of encouraging such trials, the government of Brit- Test-mill.
h Columbia has erected a test-mill, near Barkerville, which is at the resent time nearly ready for work. There are also already in the ame vicinity four small stamp-mills.

Kootanie.

This region includes the Selkirk and Purcell ranges and adjacent estern slopes of the Rocky Mountains proper. It may be conveiently divided, for purposes of description, into West and East ootanie, the line of separation following approximately the watershed etween the two arms of the Columbia River.

Since the Selkirk Mountains have been traversed by the Canadian Recent development of rich ores.
acific Railway, and have thus been rendered accessible, and a means fforded for the shipment of ores, very active prospecting has been arried on in a number of localities, and has resulted in the discovery f numerous deposits of rich ores, principally silver-bearing. This egion is, at the present moment, that in which the interest of mining nen is chiefly centred, and the developments so far made,—though but n their initiatory stages,—are of the most promising kind. The ummer of 1889 will no doubt witness great activity in this entire egion, and it is confidently expected that before the autumn the first eally considerable shipments of silver-ores will have been made, and he reputation of the region as an argentiferous one well established. Though not in a position to speak from personal investigation of the ocalities which have quite recently sprung into notice here, I am ndebted to Messrs. G. M. Sproat and A. W. Vowell, Gold Commissioners, nd to Mr. G. B. Wright, for a number of particulars, upon which and n such other information as is available, the following brief notices re based :—

West Kootanie.—

The principal metalliferous belt which has so far attracted atten- Chief metalliferous belt.
ion in this region, is believed to extend along the western slope of he mountains, with a width of about twenty miles and a general ourse slightly to the west of north, from a point six or eight miles outh of the outlet of Kootanie Lake, nearly to the Big Bend of the

Columbia, where the Selkirks, as a distinct range, seem to terminate somewhat abruptly. The localities on this metalliferous belt which require special notice, are, in order from south to north, *Toad Mountain Mining Camp*,* with silver and gold ores; *Hot Springs* and *Hendryx Camps*, with silver-ores and lead; *Illecillewaet*, with silver and lead ores; and the *Big Bend region*, apparently characterized principally by gold-bearing quartz.

Mining Camps.

Toad Mountain

Toad Mountain Camp.—The centre of the group of metalliferous deposits included under this name, is situated about four miles and a half south-west of the outlet of Kootanie Lake, some forty miles north of the International boundary, at an elevation of about 3900 feet above the lake, or approximately 5700 feet above sea-level. The deposits were discovered in the autumn of 1886. They occur principally in a belt of calcareous rock (called by the miners a lime-shale), which is said to be bounded on both sides by granite. This belt has a width of a little less than a mile, and has already been imperfectly prospected for a length of five or six miles. The course of the metalliferous belt is nearly east-and-west, running along the northern slope of the high, southern mountain-wall of the valley of the Kootanie River. The silver-bearing lodes are, however, not strictly limited to the above described belt, but have been found also in various places several miles removed from it. The claims registered in and near the Toad Mountain Camp numbered on the first of August last 228. The deepest shaft at that time did not exceed seventy-five feet, and most of the shafts or tunnels were much less than this in depth or length. The most prominent claims at the present time appear to be those in the Hall Brothers group, the "Silver King," "Kootanie Bonanza" and "American Flag." The first-named is that upon which the largest amount of work has been done. The outcrop of the vein here showed an apparent width of about twenty feet, but is reduced to a width of from six inches to four feet, at the depth to which it is now opened. There are no well-defined walls, the ore being apparently incorporated closely with the country-rock. The ore is said to consist of copper-stained iron-ore, peacock copper, copper-pyrites and tetrahedrite, with streaks of what the miners term 'brittle silver,' and is often very rich. Assays of choice specimens are said frequently to run from 100 to 1700 ounces of silver to the ton. I have seen the returns of a trial shipment of twenty-two tons of ore, sent for treatment to Montana, which yielded $6463, chiefly in silver. The ore was hand-picked, but not otherwise concentrated. It was divided into two lots, which assayed respectively:—

Silver ores.

"Silver King."

Trial shipments made.

* The expression "mining camp" is here used in its western sense, as a convenient and generally recognized term for a mining district of limited area, more or less definitely separated from others.

	I.	II.
Silver	297·70 oz.	285 oz.
Gold	$2·16	$1·44
Copper	28·9 %.	27·2 %.

Other small shipments have since been made of similarly rich ore, at no systematic plan has yet been adopted for working the mine on large scale.

Other claims shew a greater amount of galena, which is apparently present in the "Silver King" ore in very small quantity only. The "Dandy Mine" and the "Tough-nut Mine" are mentioned as shewing veins from four feet to ten feet wide, the ore from the latter being stated to assay about $100 to the ton in silver. About sixty claims in all have been partially prospected or opened up to a limited extent, most of these being within an area about three miles in length. Character of ores and veins.

West of the silver-bearing veins, and upon Cottonwood Creek, near the Kootanie River, claims have been located which show rich free-milling gold-ores. These have lately been bonded for $40,000, which amount is believed to be covered by the ore in sight, while another gold-bearing deposit has been purchased, the intention in both cases being to put in stamping machinery in the spring. Gold ores.

Most of the claims in this camp appear to be held by the discoverers at very high prices, which circumstance has up to the present time somewhat tended to prevent its rapid development.

Hot Springs Camp.—The Hot Springs Camp is situated on the west side of Kootanie Lake, about thirty-five miles from the last. It may be said to embrace an area of about five miles by three, lying between Toffee and Woodberry creeks. The country-rock is described as being mica-schist, with associated magnesian limestone, and it is said that some of the veins can be traced without apparent break or interruption for distances of one or two miles, with widths varying from two to eight feet. The argentiferous galena appears to be somewhat irregularly distributed in these veins, with a thickness varying from a few inches to three feet. Near the lake the ores are stated to assay from twenty to forty ounces of silver to the ton, but at a greater distance and elevation, the ores appear to be more decomposed, assuming a rusty appearance, and being known to the miners as 'carbonate ores.' The ores of this class are generally found to be richer in silver. About sixty claims have been partially developed in this camp. During the past season a considerable amount of capital has been invested here and good prospects have sold well. The highest price so far paid for a claim is $20,000, on a bond, a few days only after its discovery. Other claims and interests in claims have changed hands at prices ranging from $5000 to $1500. A considerable quantity of ore Hot Springs Camp. Argentiferous galena.

is now being brought down to the edge of the lake in small lots for shipment.

Quantity and quality of the ore.

In a letter received from a gentleman well able to judge of the facts, it is said that in quantity the ore of the Hot Springs Camp will equal the Cour d'Alaine mines, while in quality the ores are much better, some of them carrying three or four times the amount of silver to the ton. According to the same authority, it is stated that it appears that there are several distinct veins running northerly and southerly for a distance of about five miles, all shewing a continuous body of fair grade ore, say thirty ounces to one hundred ounces of silver, and sixty per cent. or more of lead, and that for each hundred feet in vertical depth the various veins already discovered will eventually turn out 500,000 tons of shipping ore in the aggregate.

Various claims.

Of the numerous claims taken up in this camp, some of those which have attracted most attention, and for which notes are available, are enumerated below. As before explained, while unable to speak from personal knowledge of the accuracy of the statements made, I have every reason to believe that they are in the main correct:—

"Little Donald Mine."—Situated 1250 feet above the lake. Vein, eight feet wide, shows two feet and a-half of galena, which assays 60 to 130 ounces of silver to the ton, and 60 per cent. of lead. "Krao Mine."—Galena obtained here said to run over 100 ounces of silver to the ton, and a few tons of rich 'carbonate' ore yielded 280 ounces to the ton at Butte City. "Sunshine Mine."—Apparently a strong vein, six feet wide, but little developed. Runs N. 60° W., cutting across the others. Assays said to average sixty ounces silver to the ton. "Gallagher."—Situated higher up the mountain than those above-mentioned. Ore largely the so-called carbonate ore, *i.e.*, galena, etc. decomposed by sub-aerial agencies, soft and easily worked. Assays said to run from 60 to 190 ounces silver to the ton. Contains about 10 per cent. of lead, with a large quantity of iron oxide. "No. 1 Mine."—On a line with the last. Ore of the same character. Assays from 60 to 500 ounces of silver to the ton.

Hendryx Camp.

Hendryx Camp.—Situated on the east side of Kootanie Lake, opposite Hot Springs Camp, the lake being here about a mile and a-half wide. The galena ores of this place are said to have been discovered by the botanist Douglas in 1825, and have frequently been referred to, but have only of late come into prominence, though locations have been taken up and successively abandoned several times. The ore is understood to be of comparatively low grade, but to occur in great mass and to be of easy access, being situated close to the shore of the lake. The "Blue Bell Mine" is owned by the New Haven Mining & Smelting Co., which has already spent $100,000 in preliminary work. The galena

Character of its ore.

e occurs in a series of parallel veins, separated by bands of lime-
ne, and associated with oxidized vein-matter. The vein is reported Great size of veins.
ceable on the outcrop for over 400 feet, and has been cut across at
ne depth by a tunnel 195 feet long, and shows in one place an
broken body of galena ore 86 feet in width. The galena is said to
ay from 15 to 40 ounces of silver to the ton. Several hundred tons
e been shipped and several thousand are plainly in sight. The
ootanie Chief" and "Comfort" mines, in the same vicinity, are
ned by the Ainsworth Syndicate. Little development has yet been
de on either of these, but their appearance is reported to be
ually favourable with the last.

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n addition to the above recognized 'camps,' it may be stated that Continuation northward of metalliferous belt.
this region numerous isolated 'prospects' of silver-bearing galena
e been found in the same general district. One of these is situated
ut eight miles west of the Columbia River, near the Boundary; and
ther to the east of the Columbia, on the summit of the divide
ween Slocan Lake and Kootanie Lake. 'Prospectors' report a very
ge surface showing of galena at this place. Following the Lardo
ver, which enters the north end of Kootanie Lake from the north-
stward, nearly on the line of the main metalliferous belt referred to
a former page, we find several lodes of silver-bearing ores reported,
respecting the extent or richness of these nothing absolutely certain
known. On the north-eastern arm of the Upper Arrow Lake, known
Galena Bay, locations have been recorded on a vein which is said to
ay 50 ounces in silver to the ton, and on the head waters of Fish
ver, running into this bay, another vein is reported, yielding about
0 ounces in silver to the ton. Continuing a short distance still further
rthward, we reach the Illecillewaet River and line of the Canadian
cific Railway.

Illecillewaet Mines.—This group of mines is chiefly contained in the Illecillewaet.
gle between the north and south branches of the Illecillewaet River,
a very mountainous country. Over 200 claims have been located
re, and on sixty or seventy of these the work necessary to hold them
der the provincial mining law, has been done. Some of the claims
e not far above the valley, but many are high up in the dividing
lge between the two rivers, and the ore so far brought down from
ere has been carried on mule-back.

Dr. Selwyn describes the mode of occurrence of the ores here as Mode of occurrence of ores.
llows.*—

"The argentiferous galena of Illecillewaet occurs chiefly in quartz-
ins, cutting a series of black carbonaceous or graphitic slaty shales,

* Summary Report Geol. Surv. Can., 1887, p. 4.

and thin bedded limestones, often much folded, but shewing an averag dip of from 35° to 40° to E.N.E., and apparently flattening toward the summits of the mountains. Most of the veins are parallel with th stratification, though not unfrequently passing from one bed plane t that of another. No fossils have yet been found in these slates, bu they closely resemble the black graptolitic shales, described by M McConnell, p. 22 D, Annual Report Geological Survey, 1886, and ma be of Cambro-Silurian (Ordovician) age."

Work done on claims.

This group of mines has been, on the whole, more fully develope than any in the Kootanie region. During the past two years, galen and 'carbonate' ores have been shipped in larger or smaller quantitie to Omaha or San Francisco, for smelting purposes. Work has bee steadily carried on by several companies with a view to developmen A two-thirds interest in one claim has been sold as a 'prospect' fo $16,000, and many 'prospects' have changed hands at $3000 down t small or nominal sums. The Selkirk Mining & Smelting Compan has sent out about 500 tons of ore, derived principally from th "Lanark Mine," which is situated in sight of the railway, but at a elevation of about 3000 feet above it. This ore is stated to have pro duced about 100 ounces of silver to the ton. The erection of an aeria wire tramway is contemplated. About 500 feet of tunnels have bee driven to intersect the lode, the lowest being at 400 feet below th

Various claims.

level of the out-crops, and about 300 feet of drifting in the lode ha been done. The same company holds the "Sutton," "Sprague," "Whale" and "Shark" claims to the north-west, and the "Isabella" and other claims in a south-easterly direction from the "Lanark." The Corbin & Kennedy Company also own several claims, of which their "No. 2" is stated at the present time to be the most promis ing. This vein is said to be from four to eight feet in width, and has been penetrated by tunnels for a hundred feet. It is a concen trating ore, and can be reduced to one-tenth by ordinary methods o concentration, the concentrates being reported to run from 300 to 40(ounces of silver to the ton. Promising veins of galena and grey copper ore are covered by other claims, from which assays running from 100 to 2800 ounces (in one instance) have been obtained, but no systematic work has yet been performed on any of the properties, with the excep tion of those above mentioned. Gold occurs only in traces in these ores. There is a crushing and sampling mill, capable of treating one hundred tons of ore a day, at Illecillewaet Station, on the railway, and a small village has sprung up there. This 'camp' seems to show every appearance of becoming a permanent ore-producing one of con siderable importance.

Gold only in traces.

Big Bend.—Very little is yet known respecting the prospects of vein- Big Bend.
ning in this part of the Kootanie region, but what information
been obtained is of a favourable character. There appear to be
ications that the argentiferous belt runs northward from Illecillewaet
ough it. The placer-gold mines of the district have been referred to
a former page (p. 39 R), and a number of quartz-veins are reported,
m which some exceedingly rich specimens of gold have been brought.
specting has, however, so far, chiefly been turned toward placer
nes, of which Gold Creek and its tributaries are the most noted
alities. These are reached by river, or by trail of about sixty miles
ength from Revelstoke. It is probable that prospecting for veins
l be actively carried on here in the near future. On Carnes and
Culloch creeks veins of argentiferous galena are reported.

n his official report for 1888, Mr. Sproat writes, of the West Koo- Future of the mines.
ie District.—"We already, when nothing beyond 'prospecting'
rk on mineral claims has been undertaken, have marketed about
) tons of silver-ore—most of it in galenite, of which total about 60
s have returned over 300 ounces; 100 tons, 110 to 150 ounces; and
) tons, 60 to 70 ounces, silver, per ton. The close of the season,
l want of means of transport, alone prevented more of the higher
des from being marketed. The time is not far distant when I shall
ve to report to you a product of 500 tons a day of silver ores from
s district, with a fair proportion of ores of high grade."*

East Kootanie.—

What may be described as the East Kootanie division, includes the
tern slopes of the Selkirk and Purcell Mountains, the upper parts
he Columbia and Kootanie valley, (separating those ranges from
Rocky Mountains) and the western slope of the Rocky Mountain
nge. The discoveries so far made of deposits of the precious
tals in this district, other than placer-mines, appear to be con-
ed to that portion of it to the south of the railway. Here, during
year 1888, according to Mr. A. W. Vowell, the Gold Commissioner, Claims taken up.
claims have been taken up, upon twenty-three of which assessment
rk has been performed; but with the exception of certain claims at
unt Stephen, no mining work of importance has yet been under-
en. The prospects of the district as a whole are, however, at the
sent moment extremely encouraging, and there is every reason to
eve that mining will here before long be prosecuted with vigour.

The localities which have up to the present time attracted most Principal localities.
ention, and round which most of the claims are gathered, are as
ows:—Mount Stephen, near Field Station, Canadian Pacific Rail-

* Report of Minister of Mines of British Columbia, 1888, p. 302.

way; Otter-tail, near the station of the same name; Spilimichene a Jubilee Mountain, Columbia River; Spilimichene River, Second For McMurdo district, near head of the Spilimichine River.

Mount Stephen

At Mount Stephen (Tunnel Mountain) the four original clain known as the "Monarch," "Cornucopia," "Alpha" and "Mogul," a stated to have been sold for $25,000 to the British Columbia Smelti Company, which company has expended a large sum in opening up t deposits, and has already, to the end of 1888, shipped about 600 to chiefly from the "Monarch," to their works at Vancouver. The g logical formation of this locality is fully described by Mr. R. G. M Connell in a late report of the Geological Survey,* where so account of the mineral deposits is also given. The ore is galer which frequently appears in considerable mass, nearly pure. It seer to impregnate a zone of interbedded calcareous rocks, and h been traced for a considerable distance even before the work previo ly spoken of had been carried out. It is most favorably situated f shipment, but carries a very moderate amount only of silver, whic according to assays made in the laboratory of the Survey, varies fro four to eleven ounces to the ton.

Otter-tail.

At Otter-tail, one of the claims is situated directly under the railwa track, and several others at no great distance from it. In the repo last referred to, the ore is described as an argentiferous galena, as ciated with some copper and zinc, and holding traces of gold. It occu in quartz and calcite veins, which run parallel or nearly so to the stra of the calcareous schists and limestones of the district. The vei seldom exceed eighteen inches in thickness, but the ore is reported some instances to contain a high percentage of silver. Several assa made in the laboratory of the Survey run from 5·8 to 113·7 ounces silver to the ton.

Cinnabar.

Further down the Wapta (Kicking Horse) River, not far fro Golden, and also in the immediate vicinity of the railway, a vein white calcite holding flecks of bright red cinnabar, has been 'prospecte to some extent.

Copper ores.

The deposits of copper-ore met with in Copper and Castle mountai and in their vicinity, may also be alluded to here, though, as they occ to the west of the water-shed, they lie beyond the eastern boundary British Columbia. Massive specimens of purple ore have been obtain at the first-mentioned locality, and some work has been attempted connexion with the deposits, though so far without important resul The precious metals are found in these ores in very small quantity, an generally speaking, the result of numerous assays made up to the pr sent time, is to shew that neither the lead- nor copper-ores of the Rock

* Annual Report Geol. Surv. Can., 1886, Part D.

ountains proper in this region, compare favourably in this respect th those of the Selkirk and Purcell mountains.

Jubilee Mountain, situated on the west side of the Upper Columbia ver, about thirty miles south of Golden Station, and in easy com- nication with that place by the river, has been the scene of consi- able 'prospecting' operations during the past two years. The ore- posits here are said to occur in a limestone formation and to be very ssive, though of somewhat low grade in silver and containing scarcely gold. The specimens received, show much copper in the form of per-glance and other sulphurets and some galena. They are gen- lly much decomposed, and present a rusty or greenish appearance. says of the richer specimens made in the laboratory of the Survey from 5·1 to 39·37 ounces of silver. Thirty-five claims were orded here or in this vicinity in 1888. Jubilee Mountain.

In the vicinity of the Spilimichene River, which flows into the umbia thirty-seven miles south of Golden Station, active 'prospecting' been in progress, the discoveries being in three groups, known as limichine Mountain, Second Fork of Spilimichine River and Murdo District, including the Middle Fork of the river. Not ving had an opportunity of visiting these places, I am not in a posi- n to give details relating to them. In 1888 nine claims were taken in the first, nine in the second, and twenty-one in the third. The pilimichine" and "Rothschild" claims, taken up in 1884, are d to be upon a ledge of great size, containing galena and reported average $12 to the ton in silver, without concentration. Four ims, known as the "Southern Cross," "Monitor," "Great Republic" l "Old Dominion," in the McMurdo district, are stated to have been ded for $36,000, and others have been sold. Assays are said to run m $15 to $200, almost entirely in silver. Specimens of ores received sist of quartz, holding galena, with some tetrahedrite, copper-pyrites, . Two assays made in the laboratory of the Survey shew 13·88 and 53 ounces, respectively, in silver, but it is doubtful whether these ly represent the general character of the ores. Vicinity of Spilimichene River. Various claims.

Five claims have been recorded lately on Wild Horse Creek and a e number on Toby Creek, covering deposits of argentiferous galena. e from the first-mentioned place is reported to contain $20 to $80 in ver, from the second 65 ounces of silver to the ton. The lode on oby Creek is said to be very large and well defined, and has been tly opened up on the "Jumbo claim." Wild Horse and Toby Creeks.

Interior Plateau Region.

In a number of places in the southern part of the Province, includ between the Gold and Coast ranges, or on the western and easte flanks respectively of these mountain systems, discoveries of ores ho ing silver and gold have been made. Of these the following requ special mention as being those in which groups of claims have be located and some 'prospecting' and exploratory work undertaken. these Stump Lake and Rock Creek are, however, the only ones whi as yet, are entitled to be called 'mining camps':—Cherry Cre Rock Creek, Stump Lake, Jamieson Creek, Upper Tulameen, Cayoo Creek, and Big Slide.

Principal localities.

Cherry Creek.

The occurrence of exceptionally rich silver-ore at Cherry Cre thirty-three miles east of the head of Okanagan Lake, has been kno for a number of years, and several attempts have been made towa the development of the deposit, but difficulty has been experienc in following the vein. The "Hidden Treasure Mining Compan are at present engaged in prosecuting exploratory work on a sc more extensive than previously attempted, and apparently with f prospects of success. The ore consists of argentiferous tetrahedr or freibergite, with galena and blende, the gangue being quartz, a the country-rock blackish shales or slates. Average specimens brok from a large mass of the richer ore, yielded on assay 658·43 ounces silver to the ton. In addition to the vein here particularly refer to, several other silver-bearing veins have been found in the sa neighbourhood, and pellets of galena found in the sluice-boxes on t creek above the out-crop of the principal vein, yielded at the rate 220·93 ounces of silver to the ton. These doubtless indicate additio silver-bearing deposits which have not yet been discovered.

"Monashee ledge."

Eight miles south-eastward from the placer-mines on Cherry Cre on the south slope of the mountains between Cherry Creek and Ket River, is the so called McIntyre or "Monashee" ledge. This is s to contain free gold. Some 'prospecting' has been done upon it an trail has been cut out from Cherry Creek to the ledge.

Rock Creek and vicinity.

The general character of Rock Creek, situated a short distance no of the International boundary, and east of Osoyoos Lake, is elsewh noted in connexion with its placer gold-deposits (p. 38 R). This locali has been visited by Mr. Bowman of the Geological Survey, but at t time little had been done in the matter of quartz discovery. Duri the past two years, however, general attention has here been turn in this direction, and very promising discoveries are reported, inclu ing both free-milling gold-ores (yielding some very rich specime and argentiferous galena-ores. On a claim known as the "Caribo

unnel 200 feet in length is reported to have been driven, as well as ouple of shafts of fifty feet in depth. On the "Argen" claim, a specting shaft forty-two feet deep has been sunk, and the "Van-ver" has been opened to a depth of fifteen feet. On the "Eureka" a shaft of about one hundred feet. A little mining town has already ung up here.

At a place about twenty-five miles west of Rock Creek and twelve es north of the Boundary-line, discoveries reported to be important e been made within the past few months. The ore is described as taining galena and free-milling gold. Twenty-eight locations have far been recorded here.

Nicola or Stump Lake mines.

n the year 1887, 200 claims were recorded in the vicinity of Stump ke, and during the summer of 1888, I had the opportunity of mining a number of these, comprising all those upon which any siderable amount of work has yet been done. Some locations were ginally taken up in this neighbourhood about six years ago, but specting' work appears first to have been undertaken in 1885. The ncipal developments are comprised within an area of about five es in length, with a variable breadth, lying nearly north-and-south the east side of the lake. The claims included in the property of "Nicola Mining Company" and in the adjoining property of the tar Mining Company," are those upon which the most extensive erations have been undertaken, confined, in the case of the first-med property, to development by means of several shafts and 'pros-ting' on the surface. In the case of the second, a small crushing l concentrating plant has also been established. Development and ospecting' has also occurred to a considerable extent by the "Mary ynolds Company" on the "Hepburn" group of claims, on the posite side of the valley and further south than those above men-ned, and from these, some of the richest ore, of which very satis-tory trial shipments have been made, has been obtained.

Developments made.

Mr. W. J. Sutton reports that up to the end of the year 1888, about 0 feet in all of good working shafts and tunnels have been run in course of development of these Stump Lake or "Nicola" mines.

Character of the veins.

The metalliferous veins which have been found within the limited trict above defined, are very numerous. They vary from about ten hes to five or six feet in width, and some of them have been traced a length of several hundred feet. Though it is probable, from the at number of veins which exist, that no single one will be found to continuous for a very great distance, a large supply of ore is already ured. Most of the veins run with very considerable uniformity in rings a few degrees west of true north, or from N. 10° W. to N. 30° magnetic. There are, however, a few which diverge widely from

this direction, and two or three which run nearly at right angles to The gangue is generally white quartz, and the principal metalliferc minerals present include iron- and copper-pyrites, galena, blende a tetrahedrite. Assays made in the laboratory of the Survey, r from 15 to 406·5 ounces of silver, with 0 to 6 ounces of gold per t of 2000 lbs., according to the relative amounts of the various mine constituents. The country-rock consists of altered volcanic materi of Palæozoic or Triassic age and may be generally characterized a diabase-porphyrite, the most characteristic material in this pla being a rock of green and green-grey colour with coarse porphyri crystals of plagioclase and pyroxene.

Encouraging prospects.

On the whole, the prospects for the immediate development of important mining district are here most encouraging. The occurren of these ores in the green, altered, volcanic rocks, which under slight varying forms occupy so large an area of the southern interior British Columbia, is a feature of peculiar interest, inasmuch as it lea to the belief that these wide-spread rocks become a metalliferous ser where the other conditions are favourable.*

Jamieson Creek

In the vicinity of Jamieson Creek, which flows into the Nor Thompson from the west, fifteen miles from Kamloops, a number claims have been recorded within the past two years, though very lit work has yet been done on them. The veins occur in a mass of gre ish granite, which breaks through certain black micaceous schists argillites which form an important intercalation in the Palæoz rocks, generally of volcanic origin, of this part of the Provinc The granite is highly silicious in the vicinity of the veins, and the appear to have been produced contemporaneously with the intrusion the granite. The gangue is quartz and contains pyrites, with a lit galena, blende and tetrahedrite. Assays made in the laboratory the Survey shew from seven-tenths to one ounce of gold and tv and a-half to thirty-four ounces of silver to the ton. Little can as y be proved respecting the continuity of the veins in this district, a the area within which claims have been recorded is comparative small. The surface display of quartz is, however, considerable, a this, with the rich character of the ores, would appear to warrant sor expenditure of a tentative character. The thickest vein seen is fr five to six feet in width. It may further be mentioned in this conne ion that similar veins were seen by us near the the head-waters Jamieson Creek.†

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* See Summary Report Geol. Surv. Can., 1888, p. 6. Report of Minister of Mines of B 1887, p. 275.

† See Summary Report Geol. Surv. Can., 1888, p. 7.

On the Upper Tulameen, above Granite Creek, several quartz-veins ve lately been discovered, but nothing except a limited amount of eparatory work has yet been done toward their development. I may ate, however, that the district appears to be worthy of attention by e 'prospector,' as it presents very favorable indications, and the rocks en show evidence of solfataric action, being highly silicified and lding much pyrites in certain belts. A specimen of ore collected myself at the "Bonanza Queen" location, has since been ascertained assay to contain 1·3 ounces of gold, and 5·1 ounces of silver, to the n of 2000 pounds. A remarkable indication of the existence somenere in the Tulameen basin of extremely rich ores, is found in the scovery in sluice-boxes on the river, about thirteen miles above anite Creek, of small rolled pellets of pure silver-glance strung rough with filamentous gold. Tulameen region.

On Mad River, a tributary of the North Thompson above the Clear- ter, a vein has been discovered and prospected, a specimen from nich yielded on assay in the laboratory of the Survey gold 4·37 ounces ver 21·35 ounces to the ton. Locations have also been made on the earwater, Deception Creek and Mahood Lake, but their character s not been proved. North Thompson.

The quartz-veins recently found on Cayoosh Creek, near Lillooet, out twelve miles up the creek, are the sources from which the gold the rich placer-deposits which have been worked there during the st few years, has been derived. Assays of quartz from these veins ade in the laboratory of the Survey, give a remarkably favourle showing, the gold being free and minutely and uniformly disibuted through the rock. These assays run from 0·722 to 0·992 nces in gold to the ton. The country-rock is a dark, slightly micaous slate or schist. This is much broken up and disturbed, and e veins are very numerous, but small and apparently irregular. It ould appear to be worth ascertaining, at this place, whether some rtions of the rock with its included veins would not pay for exaction and crushing as a whole. The work yet done here is erely 'prospecting.' A discovery is reported to have been made in 88, in this vicinity, between the head of Anderson Lake and Mcillivery Creek, of a strong lode of quartz containing galena, and saying to the value of $46 in silver with $14 in gold to the ton. Cayoosh Creek.

On the "Big Slide Mine," the property of the Foster Mining and illing Co., a considerable amount of work has been done and expendire incurred in bringing in and erecting crushing and chlorinating achinery, etc. The deposit, which was discovered in 1872, is situated the bank of the Fraser River near the mouth of the Kelly Lake reek. The vein is reported to be from fifteen inches to five feet in "Big Slide mine."

width and traceable for a long distance. The average value of the is reported as $22·50 to the ton, of which $20 is gold. The high assay reported is one of $118. Operations are at present suspend owing to difficulties met with in saving the gold.*

Coast Ranges.

Silver mines near Hope.

The most important discovery of silver-ore yet made in the Co Mountain belt is that near Hope, on the Fraser. The veins here i through a mass of conglomerate which caps a mountain known as Sil Peak, of which the lower part is composed of granitoid rocks. T conglomerate is believed to be of Cretaceous age. Difficulties wh have occurred in connexion with ownership, have unfortunately far prevented the working of this very promising deposit. The lowing notes concerning it are chiefly derived from the Report of Minister of Mines of British Columbia for 1874, p. 16.

"Eureka" and "Van Bremer"

About 1871, veins of silver-ore were discovered in the Coast Mo tain Range at Fort Hope about six miles south of the town. The first v discovered, named the "Eureka," crops out about 5000 feet above t river-level, is well defined, and from four to seven feet thick, and h been traced 3000 feet. A tunnel 210 feet long has been driven in this vein. For milling purposes, the ores would have to be lower about 3000 feet to Silver Creek, distant about 6000 feet. The ore described as argentiferous grey copper, and contains from $20 $1050 of silver to the ton. While this vein was being opened, a other, about 300 feet distant, was discovered. This is much rich and is called the "Van Bremer." The ore is described as chloride silver, and the vein contains from $25 to $2403 of silver to the ton. quantity taken from the out-crop sold at San Francisco for $420 a to This vein can be traced for half a mile.

A specimen of the Hope silver-ore—"a yellowish decomposed ve stone"—assayed by Dr. Harrington gave 271·48 ounces of silver the ton of 2000 lbs. It also contained lead, copper, antimony, iro arsenic and sulphur.

A specimen from the "Eureka" mine—"a vein-stone of spathic ir with some quartz"—assayed by Dr. Hunt, gave 347·08 ounces of silv to the ton of 2000 lbs., and contained also copper, antimony and s phur.

"Murphy's Mine."

About two miles above Hope, on the opposite side of the Fraser, vein occurs which is reported to hold silver to the value of $15 to $ to the ton. Some work has been done here in former years, and tunnel 540 feet long driven for the purpose of intersecting the vein.

* See Reports of Minister of Mines of B.C., 1886, pp. 211, 218, 1887, p. 273.

ome work has also been carried on from time to time, but so far Yale.
hout leading to any considerable developments, on veins situated on
e Creek, near the town of Yale. Ore from the "Queen Mining
npany's" claim is reported to contain galena, blende, iron- and
per-pyrites and to have afforded assays as high as $38 to the ton,
ilver.*

Omenica.

The situation and character of the Omenica country has already Arquerite.
n noticed in connexion with its gold-placers (p. 41 R). In associa-
n with the gold in some of the creeks, arquerite, a species of silver
algam presenting the outward appearance of native silver, is found
rains and nuggets (p 145 R). This mineral consists of silver combined
h mercury.† It has not yet been found in place either here or else-
ere in the Province, but it is worth noting that it constitutes the
ncipal ore in the mines of Arqueros, Coquimbo, Chili. Also, how-
r, in the immediate neighbourhood of the gold-deposits is a
nber of large veins carrying highly argentiferous galena, which, Argentiferous galena ores.
n the accounts received of them, appear to require only improved
ns of communication to ensure their profitable working. A num-
of claims were at one time taken up upon these, but they have
bably since been abandoned. The "Arctic Circle" and "Black
rrior" are adjoining claims on Boulder Creek. The former is said
hew a vein twenty feet wide with about four feet of highly metal-
rous ore. The latter is described as a vein eight feet wide of nearly
e galena. Other specimens of similar ores have been obtained from
eral places within a radius of eight miles of these. The "Champion
ge" is situated near Lost Creek and is similar in character, but
ticulars concerning it are wanting. Another vein on this creek is
orted to be twenty feet wide. Assays run from 29·8 ounces to 128
ces in silver to the ton, the last mentioned representing a galena
e from gangue. Some specimens also carry an appreciable quantity
gold.‡

Other Localities.

Still further north-westward, in the same general line, is the Cassiar Discoveries in Cassiar.
strict (p 43 R), in which practically nothing has yet been done toward
discovery or development of any but placer-mines. Large

* See Reports of the Minister of Mines of British Columbia, particularly report for 1879,

† The mineral when pure consists of silver 68·5 per cent. Mercury 13·5 per cent. A nugget
n this district, analysed by Messrs. Riotte and Leckhardt, of San Francisco, contained silver
0 per cent, mercury 11·00, lead 0·40, copper 0·20, as well as traces of gold, platinum, and iron.

‡ Report of Progress, Geol. Surv. Can., 1879-80, p. 110 B.

veins of quartz are reported to occur in the vicinity of some of t auriferous streams, and an attempt was at one time made to wo some of these on a small scale by means of an arastra. Argentifer galena ores also occur here, a specimen of one of which, from t South Fork of McDame Creek, on assay in the laboratory of t Survey proved to contain 75 ounces of silver to the ton, while st higher assays have been reported.

Silver-ores in Yukon district.

Far beyond the northern boundary of the province of British Colu bia, and still following the same belt of country, upon Forty-m Creek, near the point at which the Yukon crosses the 141st degree longitude (p. 44 R), argentiferous galenas are again found, one of whic collected by Mr. W. Ogilvie and lately examined, contains over ounces of silver to the ton.

Queen Charlotte Islands.

It is not possible here to include mention of the numerous isolat localities in which discoveries of ores of unproved value have been mac or in which they have been reported. A number of these appear in t list of localities and in the table of assays on later pages. Allusi is elsewhere made to the exceptionally rich, though apparent quite limited gold vein of Mitchell Harbour, in the Queen Charlot Islands (pp. 17 R, 143 R). This occurrence seems, at least to hold o encouragement for further search in the rocks of the same charact as these inwhich it is, and which are very largely developed upon t coast of the Province.

Texada.

During the last few months attention has been drawn to the exi ence of gold-bearing veins on Texada and a considerable amount 'prospecting' has been carried out on the island and a large numb of claims have been recorded. The ores are said to be pyritous a favourable assays are reported, but I am unable to give any defini particulars respecting them. Their character will doubtless be ful proved during the coming summer.

"Stirling Mine."

Reference may also be made here to the "Stirling Mine," Kokesi River, about twelve miles from tide-water, Cowichan District, Va couver Island. Some 'prospecting' work has been done here. The o is an argentiferous galena with some gold, and assays are quoted sho ing from $10 to $75 in silver to the ton.*

* Report of Minister of Mines of British Columbia, 1880, p. 431.

Table of Selected Assays of Ores from British Columbia, Containing Gold and Silver.

Note. *Most of the assays quoted here in summary form, have been made in the Laboratory of the Geological Survey. The various reports in which there are given at length, are denoted simply by the date and page, in the last column. Those to be included in the report for* 1888, *have not yet been published. A few additional authentic assays from other sources, are also quoted.* (*Names of minerals specially prominent in any ore are printed in italics.*)

Cariboo District.

No.	Locality.	Associated Minerals.	Gold. Ounces.	Silver. Ounces.	Reference.
1	"Big Bonanza," between Williams and Lightning Creeks, Cariboo. (Highest assay of specimens received)	Quartz with some pyrites	0·554		76-77, p. 478
2	Cariboo, average of 9 samples (separate localities not stated.)		1·424	0·266	77-78 p. 49 G.
3	"Discovery claim," Little Snow-shoe Ck., Cariboo	Rusty quartz with limonite and iron-pyrites	0·408	0·058	87, p. 40 T.
4	"Flynn's diggings," Mosquito Ck., Cariboo	Galena and iron-pyrites	0·182	36·458	87, p. 44 T.
5	"Dufferin ledge," Grouse Ck., Cariboo	Quartz with *pyrites*	2·042	0·292	87, p. 45 T.
6	"Proserpine ledge," Barkerville, Cariboo	Quartz, chlorite, iron-pyrites, galena	0·787	29·738	87, p. 45 T.
7	"Home Rule ledge," Barkerville, Cariboo		traces.	25·521	87, p. 45 T.
8	"Perkins ledge," Burns Mt., Cariboo	Rusty Quartz with galena	2·625	3·033	87, p. 46 T.
9	" " " "	*Galena*, quartz, iron-pyrites	0·365	29 896	87, p. 46 T.
10	Hixon Creek Mine, Cariboo		0·403	1·225	87, p. 47 T.
11	" " "	Quartz with copper-glance, copper-pyrites, galena, etc	0 583	29 983	86, p. 37 T.
12	" " "	(Concentrates)	8·021	18·229	86, p. 37 T.

West Kootanie.

13	Toad Mountain	Association of Limonite, calcite and quartz, with copper-pyrites, tetrahedrite and iron-pyrites		59 687	1888.
14	Toad Mountain (vicinity of)	Bornite and quartz		119·218	87, p. 50 T.
15	"Silver King Claim," Toad Mt., (assay by Johnson & Matthey)		trace.	771 000	
16	"Silver King Claim," Toad Mt., (assay by Johnson & Matthey)	(Specimens collected by Mr. R. D. Atkins)	trace.	422·000	
17	"Silver King Claim," Toad Mt., (assay by Johnson & Matthey)		trace.	75·800	
18	"Silver King Claim," Toad Mt., average assays of trial shipment, in two lots	Contained copper 28·9 p. c	0·108	297·70	
19					

22	"International Claim," west side Kootanie Lake	Galena, tetrahedrite, etc		13 134	85, p. 26 M.
23	"International Claim," west side Kootanie Lake	Chiefly galena	traces.	10·719	85, p. 26 M.
24	Fifteen miles up Fish River, Upper Arrow Lake	*Galena*, iron-pyrites and quartz		108·646	1888.
25	Illecillewaet River	Galena, blende, iron-pyrites, quartz	trace.	45·2 8	87, p. 52 T.
26	" " north side	Quartz, iron-pyrites, galena		247·917	87, p. 53 T.
27	" " south side	Galena, tetrahedrite, iron-pyrites, quartz		484·167	87, p 53 T.
28	Three miles up N. Fork Illecillewaet, east side	*Galena* with a little quartz and calcite		80·937	1888.
29	"Minnie F. Claim," six miles up N. Fork, Illecillewaet, east side	Quartz, *galena*, tetrahedrite, iron- and copper-pyrites		139·427	1888.
30	Six miles up N. Fork Illecillewaet, west side	Quartz, *galena*, copper-pyrites	trace.	30·988	1888.
31	"Edmond's Claim," two miles from Illecillewaet station, N, of C. P. Ry	Quartz, *galena*, iron-pyrites, etc		116·302	1888.
32	"Maple-Leaf Claim," Illecillewaet River	*Galena* with calcite, etc		65·625	86, p. 40 T.
33	"Shamrock Claim," Illecillewaet River	*Galena* with calcite		78·750	86, p. 40 T.
34	Illecillewaet (vicinity of)	*Galena*, copper-pyrites and calcite	traces.	79·956	85, p. 28 M.
35	" "	Chiefly galena	traces.	74·521	86, p. 33 T.
36	" "	Quartz with *galena* and blende		142·187	86, p. 33 T.
37	" "	Galena		66·354	86, p. 34 T.
38	" "	Galena	trace.	74·375	86, p. 34 T.
39	" "	Quartz with tetrahedrite, copper-pyrites, etc	trace.	248·646	87, p. 53 T.
40	" "	Galena, quartz		47·393	87, p. 53 T.
41	" "	Quartz, galena, tetrahedrite, blende, iron-pyrites	trace.	127 604	87, p. 54 T.
42	" "	Galena	trace.	57·604	87, p. 54 T.
43	" "	Galena and quartz	trace,	54·687	87, p. 54 T.
44	" "	Galena and quartz	trace.	67·813	87, p. 54 T.
45	" "	Galena, tetrahedrite, quartz		180·104	87, p. 54 T.
46	" "	Galena with a little calcite		53·230	86, p. 39 T.
47	" "	Galena	traces.	64·859	87, p. 50 T.
48	" "	Quartz and galena		21·208	87, p. 51 T.

East Kootanie.

49	"Monarch Mine," Mount Stephen	Galena with a little quartz		5·104	1888.
50	Mount Stephen (Tunnel Mt.)	Galena	traces.	3·996	85, p. 24 M.
51	" " "	Galena with a little copper-pyrites	traces.	4·010	85, p. 24 M.
52	" " "	Galena with a little copper-pyrites	traces.	11 302	85, p. 24 M.
53	" " "	Galena with a little iron-pyrites	traces.	3 281	85, p. 24 M.
54	Near Mount Stephen (Tunnel Mt.)	Galena		3·646	86, p. 40 T.
55	" " "	Galena		6·563	86, p. 40 T.
56	Otter-tail River	*Galena*, copper-pyrites, etc		16·771	86, p. 39 T.
57	" "	*Galena*, *tetrahedrite*, copper-pyrites, quartz, etc		113·749	86, p. 39 T.
58	" "	Quartz, with *galena* and copper-pyrites	traces.	5·833	85, p. 24 M.
59	Near Otter-tail Station, C. P. Ry	Purple copper ore		19·687	87, p. 47 T.
60	"Granger's New Location," Jubilee Mountain	Quartz and dolomite with copper-glance and copper carbonate		39·375	1888.
61	"Wells Claim," Jubilee Mountain	Quartz with galena and iron-pyrites		5·104	1888.
62	"Wells Old Location," Jubilee Mountain	Copper-glance, copper carbonates and haematite		22·571	1888.
63	Jubilee Mountain	Copper-glance with copper carbonates and dolomite		11·667	1888.
64	" "	Copper carbonates and ferric hydrate, a little copper-glance		2 187	1888.

No.	LOCALITY.	ASSOCIATED MINERALS.	GOLD.	SILVER.	Reference.
			Ounces.	Ounces.	
65	Spilimichene River, Purcell Range	*Galena* and iron-pyrites	traces.	8·094	85. p. 27 M.
66	"Golden Gate Claim," Carborate Creek, McMurdo District	Quartz with *tetrahedrite*, galena, iron-pyrites	traces.	13·887	1888.
67	"Monitor Claim," Middle Fork Spilimichene	Galena	traces.	37·537	1888.
68	Toby Creek	Quartz with *galena*	.....	38·646	1888.
69	North Fork Toby Creek	Coarse crystalline galena	traces.	66·354	1888.
70	Goat River, Kootanie	*Galena* with quartz and iron-pyrites	.....	14·583	86, p. 40 T.
		Big Bend Region.			
71	"Taylor Lead," Big Bend	Quartz, with galena and iron-pyrites	0·175	0·641	86, p. 38 T.
72	"Little Bunting Lead," Big Bend	Quartz, with ferric hydrate and mica	1·925	0·175	86, p. 38 T.
73	Big Bend District	Quartz, with galena	traces.	43·750	86, p. 36 T.
74	"North Lead," Columbia Claim, McCulloch Ck., Big Bend	Rusty quartz, with galena	traces.	16·975	86, p. 39 T.
75	"Silver King Mine," Big Bend	*Galena*, specular iron, quartz	traces.	21·875	86, p. 36 T.
		Omenica.			
76	"Champion Ledge," near Lost Creek, Omenica	Quartz, with *galena* and pyrites	trace.	19·723	78-79, p.24H.
77	"Arctic Circle Claim," Boulder Creek, Omenica	*Galena*, iron oxide	.....	128·078	78-79, p.25H.
78	" " " " " (Assay by Johnson & Matthey.)	.....	.....	44·2	79-80, p.111B
79	"Arctic Circle Claim," Boulder Creek, Omenica. (Assay by G. W. Hopkins.)	.....	trace.	40·81	79-80, p.111B
80	"Black Warrior Vein," Boulder Creek, Omenica (Assay by Johnson & Matthey.)	.....	.....	29·08	79-80, p.111B
81	"Black Warrior Vein," Boulder Creek, Omenica. (Assay by Riehn, Hemme & Co.)	.....	.....	93·00	79-80, p.111B
82	"Mammoth Ledge," Omenica (Assay by Thos. Price.)	.....	0·1	32·40	79-80, p.111B
83	"Mammoth Ledge," Omenica (Assay by Riehn, Hemme & Co.)	.....	0·314	91·13	79-80, p.112B
84	Vein near Manson Creek, 20 miles from "Dunkeld,"	Quartz, with a little galena	trace.	8·971	75-76, p. 430
		Cassiar.			
85	"Acadia Claim," South Fork of McDame Creek, Cassiar	*Galena*, iron- and copper-pyrites, etc	.....	74·772	1883.
		Yukon District.			
86	Forty-mile Creek, Yukon District	Chief			

87	"Carbonate Lode," Rock Creek (Laboratory of Survey)	Galena, somewhat oxidized	trace.	64·166	
88	"Bonanza Queen," Tulameen R. (Laboratory of Survey)	Iron- and copper-pyrites, etc., with some galena, in quartz	1.342	5 133	
89	Cherry Creek Mine	Quartz, with tetrahedrite, galena and zinc-blende	trace.	658·437	77-78, p.50G.
90	" " "	" " " " "	.....	255·937	77-78, p.51G.
91	Cherry Creek (found in sluice-boxes)	Galena	.....	220·937	77-78, p.50G.
92	North Fork of Cherry Creek	Quartz, with galena, pyrites, etc.	0·058	8·254	77-78, p.50G.
93	"Hepburn Claims," near Stump Lake	Rusty quartz, galena	0·759	406.574	87, p. 38 T.
94	"Nicola Mining Company," Stump Lake	Quartz, with *galena*, tetrahedrite, iron-pyrites, copper-pyrites, bornite	0·729	104·271	86, p. 37 T.
95	Stump Lake (vicinity of)	*Galena*, copper-pyrites, etc.	traces.	20·339	87, p. 38 T.
96	" " " "	Quartz, with *galena*, etc.	6·096	90·650	87, p. 39 T.
97	" " " "	Quartz, with tetrahedrite, galena, iron-pyrites and blende	0·729	39 521	86, p. 35 T.
98	" " " "	Quartz, with *galena* and iron-pyrites	traces.	20 927	86, p. 35 T.
99	" " " "	" " " " "	0 729	15·094	86, p. 38 T.
100	" " " "	Quartz, with *galena*, iron-pyrites and copper-pyrites	1·969	17·063	86, p. 38 T.
101	"Zeran Mine," Scotch Creek, Shuswap Lake	*Galena*, copper-pyrites, quartz and calcite	traces.	11 667	86, p. 34 T.
102	" " " " " "	Quartz, with *galena*	traces.	35·000	86, p. 34 T.
103	" " " " " "	*Galena* quartz	traces.	46.667	86, p. 34 T.
104	" " " " " "	*Galena*, iron-pyrites, quartz	traces.	10·208	86, p. 35 T.
105	"Home-Stake," Jamieson Creek, N. Thompson	Rusty quartz, with a little galena	1·108	34·242	1888.
106	"Silver King," Jamieson Creek	Rusty quartz, with small quantity galena and tetrahedrite	0 583	21·525	1888.
107	"Silver Queen," Jamieson Creek	Rusty quartz, with a little galena	0·758	28·992	1888.
108	"Kamloops". Jamieson Creek	Rusty quartz, with galena and iron-pyrites	6·700	25·200	1888.
109	Mad River, N. Thompson, above Clearwater River	Quartz, etc.	4·375	21·350	87. p. 49 T.
110	"Crown Point Ledge," left bank Cayoosh Creek	Rusty quartz	0 992	.....	1888.
111	"Bonanza Location," right bank Cayoosh Creek	" "	0·991	0 058	1888.
112	" " " " " "	" "	0·722	.....	1888.
113	South Fork Bridge River	Rusty quartz, with carbonates of copper	dist. trace.	20·833	1888.
114	"Big Slide Mine," Fraser R. (assay at Nevada Metallurgical Works)	Quartz, with pyrites, etc.	1·21	2·43	
115	Fraser River, 25 m. above Lytton	Tetrahedrite	trace.	5·833	1888.
116	Fraser River, 23 m. above Lytton	Stibnite	trace.	2·187	1888.

Coast Ranges and Coast.

117	"Eureka Mine," near Hope	Yellowish decomposed veinstone	.....	221·666	76-76, p. 478.
118	" " " "	" " "	.....	271·48	73-74, p. 7.
119	" " " "	" " "	.....	285·60	71-72, p. 66.
120	"Yale Creek Mine," Yale (three assays by J. H. Collins).	Iron-pyrites, blende and a very little copper-pyrites	traces.	13 to 70	
121	"Queen Mine," Yale Creek	Chiefly blende and iron-pyrites	traces.	2·800	85, p. 28 M.
122	"Sterling Mine," Kokesaila River, Cowichen, V.I.	Galena and copper-pyrites in dolomite and quartz	traces.	9 844	79-80, p.20H.
123	" " " " " "	" " " " " "	traces.	19 323	79-80, p.20H.
124	" " " " " "	" " " " " "	traces.	8·021	79-80, p.26H.
125	" " " " " "	" " " " " "	traces.	5·104	79-80, p.20H.
126	"Malaspina Copper Mine," Texada I.	Copper-pyrites, iron-pyrites, etc.	trace.	10·209	87, p. 55 T.
127	"Kitamat Ledge," Gardner Inlet	Quartz, with copper-pyrites, blende, galena	trace.	4·433	87, p. 54 T.
128	Six miles up Zymoetz River, Skeena	Quartz, with *galena*, copper- and iron-pyrites	0 049	1·079	77-78, p. 51G

Coal.

Discovery of coal near Suquash.

The discovery of coal in British Columbia antedated that of gold more than twenty years, but did not at first produce any effect co parable with that of gold upon the history of the country. Dr. W. Tolmie was the first to make known the existence of coal, on the co of the Province, in 1835. He was then stationed at the Hudson I Company's post, known as Fort McLoughlin, on Milbank Sound, a specimens of coal were brought to him by Indians from the nor east coast of Vancouver Island,—doubtless from Suquash. T

Steamer Beaver.

steamer *Beaver*, belonging to the Company, arrived on the West Co in 1836, and thereafter small quantities of coal were obtained her, as well as for blacksmiths' use, from this place; being deri from natural outcrops on the beach. In the year 1849, a coal-mi was brought out by the Company, from Scotland, to more fully t the character of the coal on this part of the coast, and in 185 further number of miners and some necessary machinery were i ported. Exploratory work by sinking and boring was prosecu along the coast of Vancouver Island, between Port McNeill and Bea Harbour, till 1853, but without resulting in any very notable discoveri

Discovery of coal at Nanaimo.

Meanwhile, in 1850, the existence of coal at Nanaimo had be ascertained by Mr. J. W. McKay, and in the following year it appe that the most of the miners above referred to were transferred fr the northern end of the island to that place. Work began in earn at Nanaimo in 1852, and before the close of 1853, 2000 tons are repo ed to have been shipped, chiefly to San Francisco. The price coal at Nanaimo was at this time $11 and at San Francisco $2 ton. The Hudson Bay Company, under the name of the Nanaimo C

Initiation of mining.

Company, continued to work the mines thus opened till 1861, wh these were sold to the Vancouver Coal Mining and Land Compa (limited), by which they are still operated. The total shipme from October, 1852, to November, 1859, are returned at 25,398 ton

Wellington mines.

The Wellington Mines, situated a short distance inland from Depa ure Bay, near Nanaimo, began to produce coal in 1871, and seve hundred tons of coal were shipped in that year. This colliery, like t last, has since continued in active operation, with yearly increasi output, and from the various openings belonging to these two enterpri by far the greater part of the coal product of the Province is obtain

Other mining enterprises.

In 1871 mining operations were in progress at Cowgitz, Queen Ch lotte Islands, and several hundred tons of anthracite were shipped, b the work was not continued. In 1874 the Harewood Colliery, ne

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* For many details on the early history of the industry see Bancroft's Works. vol. xxxii., 185, 565; also Annual Report Geol. Surv. Can., 1886, pp. 65 B., 69 B

naimo, was opened. It had previously been worked on a small ale in 1864 and 1865. In 1875 the Baynes Sound Colliery, near mox, was opened out to some extent, and preparations for mining d shipping coal were made, but from various causes, chief among hich was the low price of coal, both this and the Harewood were sed down in 1877. In 1882 a shaft was sunk at the East Wellington lliery, about midway between the Vancouver and Wellington mines, d a certain amount of coal has since been annually produced here.

Work at Comox.

With the exception of the Baynes Sound mine, the collieries above entioned are all in the Nanaimo area, and the work done in the mox area (except in the case of the Baynes Sound mine) was of the aracter of 'prospecting' and exploration only. In 1888, however, the rious development of mining work in the Comox area has been ini- ted by Hon. R. Dunsmuir at points situated between the old Baynes und mine and Comox Harbor, near the edge of the old "Union laim." A railway, eleven miles in length, has been built to a suitable ipping place, and all preparations are being made for a large output coal. This enterprise is known as the Union Colliery.

Progress of coal mining.

Since the initiation of coal-mining in the Nanaimo district, this lustry has shewn a steady and satisfactory increase, and it has now tained large proportions, as evidenced by the subjoined table of out- t. Both the exports and the local consumption are constantly in- easing, the latter being returned at 115,953 tons in 1888.*

TABLE SHEWING THE ANNUAL PRODUCTION OF COAL IN BRITISH COLUMBIA.†

Annual and total output of coal.

	TONS.‡
Coal mined at Suquash by H. B. Co. at various times between 1836 and 1852 (say)	10,000
Total coal shipped from Nanaimo, October, 1852, to November, 1859	25,398
1859 (Two months)	1,989
1860	14,247
1861	13,774
1862	18,118
1863	21,345
1864	28,632
1865	32,819
1866	25,115
1867	31,239
1868	44,005
1869	35,802
1870	29,843

This includes the coal used at the mines.

This table is I believe the first approximately complete statement of the annual output of the nes. I am indebted to Mr. S. Robins and Hon. R. Dunsmuir for the figures relating to years n previously published.

These and other figures relating to coal, (except California imports on following page) refer to t ton of 2240 lbs.

		Tons.
1871	(Exclusive of Wellington Mines)..... 35,643*	
1872	" " " 46,468	148,459
1873	" " " 45,731	
	(Wellington Mines, 1871-73..... (21,182)	
1874	.....	81,547
1875	.....	110,145
1876	.....	139,192
1877	.....	154,052
1878	.....	170,846
1879	.....	241,301
1880	.....	267,595
1881	.....	228,357
1882	.....	282,139
1883	.....	213,299
1884	.....	394,070
1885	.....	365,596
1886	.....	326,636
1887	.....	413,360
1888	.....	489,301
Total	.....	4,358,221

Places to which coal is exported.

The exports of coal are chiefly to ports in California, including, 1888, San Francisco, Wilmington and San Diego. Sundry cargoes we also shipped to Seattle, W.T.; Portland, Oregon; Alaska; Petropavlovsk Hawaiian Islands; China and Japan. Coal has also been supplied du ing the year to H.M. Navy, and to U.S. war and revenue vessels well as to ocean mail steamers and other vessels calling for fuel.

Coal imports of California.

The standing of British Columbia coal in respect to the supply California, which constitutes the principal market, is well shewn b the subjoined statement of the sources of coal imported into that Sta in 1888.†

	Tons.
British Columbia	345,681
Australia	271,612
England and Wales	126,167
Scotland	10,680
Eastern States (anthracite, etc.)	30,118
Total from coal mines on or near Puget Sound, W.T., including Seattle, Carbon Hill, Green River, Cedar River, Renton, Newport, South Prairie, etc	568,948
Coos Bay	47,015
Japan	13,808
Coal from various sources, other than British Columbia, received at Wilmington and San Diego, (estimated at)	151,068
Total coal imports of California in 1888	1,565,097 tons

* Including 565 tons Queen Charlotte Islands anthracite.

†These statistics, and the places of destination of coal above, from Report of Minister of Min of B.C., 1888, p. 330.

The following particulars for the various collieries in operation in Nanaimo and Comox, are derived from the Report of the Minister of Mines of British Columbia for 1888.— Collieries now in operation.

Nanaimo Colliery.—Description of seams and workings.—South Field No. 2, worked by slope, seam, 6 to 10 feet thick. South Field No. 3, worked by shaft, seam, 5 to 10 feet thick. No. 1 shaft, seam, 5 to 12 feet thick. Total out-put 258,817 tons, 8 cwt.

Wellington Colliery.—Description of seams and workings.—Four working shafts, known as No. 3 pit, No. 4 pit, No. 5 pit, No. 6 shaft (sinking.) Three air shafts. Seams 6 to 10 feet thick. Total out-put 38,392 tons.

East Wellington Colliery.—Description of seams and workings.—Two shafts, known as Nos. 1 and 2 respectively. Total out-put 30,092 tons.

Union Colliery.—(Comox).—Description of workings.—One shaft, one slope, four levels, three tunnels, one air-shaft. Total out-put 2000 tons. (This mine is in process of being opened.)

The number of miners employed in the various Collieries in 1888, is as follows :— Miners employed.

	Boys.	Whites.	Chinese.	Indians.	Total.
Nanaimo Colliery....	30	819	80	16	945
Wellington Colliery ..	10	585	100	None	695
E. Wellington Colliery	2	120	10	None	132
Union Colliery.....	None	90	150	None	240

Total miners employed in 1888. 2012

The wages paid to white miners at present, range from $2 to $4 a day, and the earnings of miners working on contract from $3 to $4·50. Chinese are paid at from $1 to $1·75, and Indians about $2 a day. Wages.

Several serious accidents from explosion of fire-damp have occurred in the history of the Nanaimo mines, viz.—Wellington Colliery, April 1, 1879, 11 lives lost; No. 1 Pit, Vancouver Colliery, May 3, 1887, 150 lives lost; No. 5 Pit, Wellington Colliery, Jan. 24, 1888, 77 lives lost. Accidents.

Coal- and Lignite-bearing Formations of British Columbia.

While the coals of Nova Scotia and of the eastern half of the United States are derived from the Carboniferous formation, of Palæozoic age, those of the Great Plains and Pacific Slope occur in association with much newer rocks, referable to the Mesozoic and Tertiary periods. Although in the western part of the continent rocks of Carboniferous age are known, and frequently appear in great thickness and covering extensive areas, they generally represent the Coal-bearing formations of the East and West.

accumulations which have taken place in sea-bottoms, and consi largely of limestone; the swamps and marshy estuaries whi afforded the conditions for the accumulation of vegetable matt elsewhere giving rise to the production of coal-beds, do not, so far as y known, appear to have occurred during this period, in the West. Co ditions of this kind, however, existed very generally in the West duri certain stages of the Mesozoic and Tertiary, while rocks of these perio are developed on a comparatively small scale in the eastern half of t continent, and are there seldom found to contain coal.

Coal producing rocks of British Columbia.

In British Columbia, the formations known to contain mineral fu of economic value, of the character of coals or lignites, are (1) the Cr taceous, or highest member of the Mesozoic, (2) the Tertiary. Respe ing the latter, it is not yet clear whether all the coal- or lignite-beari rocks included under it are referable to a single stage, but it is prol ble that at least most of them belong to the middle member of the T tiary, or Miocene.

Fuels of the Cretaceous and Tertiary.

Rocks of Cretaceous age are developed over a considerable area British Columbia, often in very great thickness, and fuels occur them in important quantity, in at least two distinct stages, of whi the lower and older includes the coal-measures of the Queen Charlot Islands and those of Quatsino Sound on Vancouver Island, with those Crow Nest Pass in the Rocky Mountains; the upper, the coal-measures Nanaimo and Comox, and probably also those of Suquash and oth localities. The lower rocks hold both anthracite and bituminous co in the Queen Charlotte Islands, but elsewhere contain bitumino coal only. The upper have so far been found to yield bituminous coal onl The fuels of the Tertiary rocks are, generally speaking, lignites, b include also various fuels intermediate between these and true coa which in a few places become true bituminous coals.

All grades of coal represented in British Columbia.

The series of mineral fuels thus presented by British Columbia alo ranging from anthracites which compare favourably with those Pennsylvania and Wales, to lignites, in which the original woo structure is still clearly preserved, and all embraced within the upp part of the Mesozoic and the Tertiary, is sufficient to disprove t theory at one time maintained, that the Carboniferous formation is t only one capable of yielding true coals. It is now generally ackno ledged, that the character of such fuels depends essentially on the co ditions of metamorphism to which they with the rocks containing the have been subjected, and only in secondary degree on their relative absolute age.

Order of description.

It will, however, be most convenient, in presenting such no as are here necessary on the various coal-bearing areas of t Province, to begin with those of the Cretaceous period, and this ord

further rendered appropriate by the relative importance of the fuels that age. As most of the coal-fields are described at length in one other of the reports of the Geological Survey, to which reference ay be made, it is not intended here to enter into details with respect them.

Principal Coal-fields (Cretaceous).

The most northern Cretaceous coal-field of the coast is that of the Queen Charlotte Islands. It extends over parts of Graham and Moresby lands, on both sides of Skidegate Inlet, and is believed to run across e first-named island to the outer or ocean coast, though as yet only rtially explored. Its area is considerable, and it has been in part ologically examined and mapped by the late James Richardson and the writer.* In the vicinity of Skidegate Inlet, the Cretaceous cks containing the coal are made up of the following sub-divisions, descending order.— Queen Charlotte Islands.

	Feet.
A. Upper shales and sandstones	1,500
B. Conglomerates	2,000
C. Lower shales and sandstones	5,000
D. Agglomerates (of volcanic origin)	3,500
E. Lower sandstones	1,000
	13,000

The coal, so far as known, is confined to the base of the Lower shales d sandstones (C), and is proved by its associated fossils to be proximately of the age of that member of the Cretaceous formation own as the Gault.

At Cowgitz, in Skidegate Inlet, the Queen Charlotte Coal Mining ompany, about 1871, constructed a wharf, houses, tramway, etc., and tempted to work the coal-seams, which have there the character of thracite, but met with difficulties in following the seams, of which me portions were also found to be in a crushed and pulverulent state. hough these efforts were not attended with success, the work was not rried far enough to prove that the coal in this vicinity is not of a orkable character. Further exploration appears to be fully justified what is known of the place, and I believe that work of this charac- r is at the present time in progress. The beds containing the anthra- te here are almost vertical, and it is evidently on account of the sturbance and local alteration which it has suffered that the coal has assed into the condition of anthracite. The best seam found, had a aximum thickness of a little over six feet, while a second out-crop owed two feet five inches, and other less important out-crops also oc- Anthracite at Skidegate.

* See Report of Progress Geol. Surv. Can., 1878-79.

cur. Mr. Richardson was originally of opinion that several distin seams exist at this place, but it now appears more probable that th various out-crops represent a single seam, repeated by folding.

Analysis of anthracite.

In composition, the anthracite of the Queen Charlotte Islands com pares favorably with that from Pennsylvania. The following analys by Dr. Harrington* were from samples collected by Mr. Richardson No. 1 being from the six-foot seam; No. 2 from the so-called three-foo seam (2 feet 5 inches).—

	I.	II.
Water	1·60	1·89
Volatile combustible matter	5·02	4·77
Fixed carbon	83·09	85·76
Sulphur	1·53	0·89
Ash	8·76	6.69
	100·00	100·00

Bituminous coal on Ya-koun River.

Further north, in the same Cretaceous area, on the Ya-koun Rive about midway between Skidegate and the head of Masset Inlet, a di covery has lately been made of bituminous coal of excellent quality The bed is reported to be a very thick one, (18 feet), and several ton of the coal have been brought out, and tested with favorable result Means of communication with the coast must, however, be provide before this deposit can be utilized. It is not certainly known whethe this coal occupies the same position in the Cretaceous series as that o Cowgitz, but it is very probable that it does so.

Analysis.

The character of this coal is shown by the following analysis by M Hoffmann.†—

Hygroscopic water	2·65
Volatile combustible matter	30·59
Fixed carbon	61.33
Ash	5·43
	100·00

Coal-fields of Northern Vancouver Island.

In the northern part of Vancouver Island, the Cretaceous coal-bea ing rocks, though occupying but a small portion of the surface a compared with the older formations, have in the aggregate a considera able extent. The principal areas are those of Forward Inlet, Koprin and Koskeemo, all on the shores of Quatsino Sound, and of Suquash, o the north-east coast of the island. Of the Quatsino Sound areas, th only one which has yet attracted much attention is that referred to a the Koskeemo, which is situated on the upper part of Quatsino Sound In this area, some exploration, both by sinking and boring, has a

* Report of Progress, Geol. Surv. Can., 1872-73, p. 81.

† Annual Report, Geol, Surv. Can., 1887, p. 17 T.

rious times been carried out, though so far without resulting in the dis- Koskeemo.
very of a coal-seam of a satisfactory workable character; the greatest ickness of good coal yet proved being about three feet only. The tal length of this small Cretaceous area is about seven miles, its eatest probable width about two miles, and its approximate area, t including under-water extensions, about 5630 acres. Particulars specting this area, with a map and details of borings, etc., may be und in the annual report for 1886.* The coal is bituminous, and is ten of excellent quality. An analysis of a specimen, made in the boratory of the Survey, gives the following result.—

Analysis.

Hygroscopic water	1·05
Volatile combustible matter	34·38
Fixed carbon	54·01
Ash	10·56
	100·00

In the Forward Inlet Cretaceous area, coal is found at the head of Forward Inlet.
e lagoon above Winter Harbour, but much disturbed locally and in. It is not improbable, however, that boring operations on Winter arbour would result in the discovery of better seams.† It appears kely that this area really connects eastward with that of Koprino, Koprino.
hich extends along the north shore of the lower part of Quatsino und for seven or eight miles, and has a considerable width. Though coal has yet been found in the last-mentioned area, it is larger than ther of the others on Quatsino Sound, and as the beds are regular and tle disturbed, it may, on proper investigation by boring, prove to be e most important.‡

The coal-field referred to as the Suquash area, extends along the Suquash area.
rth-east coast of Vancouver Island from Port McNeill to Beaver arbour, a distance of fourteen miles. Its width inland must be con-derable, and it probably also includes Malcolm Island, to the east-ard, of which the surface is almost entirely covered by drift deposits. he original discovery and early exploration for and working of coal this place are elsewhere referred to, (p. 80 R). The coal-seams as et found here are quite thin, the thickest, at Suquash, not exceeding vo feet. In consequence, however, of the flat-lying position of the eds along the shore, the exposures are poor, and but a small part of e thickness of the Cretaceous rocks is shown. The regularity of the eds and their extent are favourable to mining operations should icker seams be discovered by boring. Particulars respecting this

* Part B, p. 90 B., *et seq.*
† See Annual Report Geol. Surv. Can., 1886, p. 83 B.
‡ *Ibid.* p. 87 B.

district are to be found in the report already referred to.* The co found at Suquash is of very fair quality, as evidenced by the subjoine analysis.—

Analysis.

Hygroscopic water	5·03
Volatile combustible matter	41·51
Fixed carbon	46·52
Ash	6·94
	100·00

Relative age of the coals.

Respecting the stratigraphical position of these coal-bearing Creta ceous rocks of the northern part of Vancouver Island, it may be state that the coals of Quatsino Sound generally, are believed to occur at th same horizon with those of Cowgitz, or in Series C, of the Queen Cha lotte Islands section, while those of Suquash appear to belong to higher stage.

Reports on Nanaimo and Comox.

The Comox and Nanaimo coal-fields are the most important in th Province, and the latter is that from which almost all the coal so fa raised has been obtained. They have been in large part carefull examined by Mr. Richardson, whose various reports in the annua volumes of the Geological Survey for 1871–72, 1872–73, 1873–74 an 1876–77,† may be consulted for details.

Coal fields of Southern Vaucouver Island.

The Cretaceous rocks constituting these coal-fields, border the south western side of the Strait of Georgia, forming a belt of comparatively low, rolling or hilly country between the mountainous region of th interior of Vancouver Island and the coast. This belt, including th Cowichen area, reaches to within about eighteen miles of Victoria t the south-eastward, and to the vicinity of Cape Mudge in the opposit direction, with a length on the shore of about 130 miles. Its continuit is broken however at two points, near Maple Bay and near Nanoos Harbour, respectively, where the older underlying rock-series come out to the shore. Beyond Cape Mudge, it runs inland in the sam general north-westward bearing, but its extent in this direction is stil unknown.

Stratigraphical relations.

The rocks accompanying the coals are sandstones, conglomerate and shales, being largely of the character of littoral formations but also containing, (particularly in the shaly members of the series) truly marine fossils. They hold also in some layers abundance o fossil plants, and in appearance and degree of induration much re semble the older Carboniferous rocks of some parts of Eastern America. Coals of a workable character have been found only in the

* Annual Report Geol. Surv. Can., 1886, p. 61 B.

† In the last-named report, a general review of the geology is given. See also Annual Report Geol. Surv. Can., 1886, p. 16, B.

er part of the Cretaceous series, which is represented with closely ilar characters in the Comox & Nanaimo areas. The somewhat iable character of the Cretaceous measures as a whole is, however, wn by the fact that Mr. Richardson found it necessary to adopt a ierent scheme of sub-divisions for the two areas, notwithstanding ir general correspondence. The sections at Comox & Nanaimo are follows, in descending order.— Sections at Nanaimo and Comox.

Comox.	*Feet.*	Nanaimo.	*Feet.*
Upper conglomerates.....	320	Sandstones, conglomerates and shales.....	3290
Upper shales.....	776		
Middle conglomerates.....	1100		
Middle shales.....	76		
Lower conglomerates.....	900		
Lower shales.....	1000	Shales.....	660
Productive coal-measures...	739	Productive coal-measures....	1316
	4911		5266

he age of the Productive Coal-measures of Nanaimo & Comox is approximately that of the Chico group of California, in which, however, ts typical locality, coals are not found.

he Comox area has probably a greater extent of productive measures Comox coal-fields. may eventually become more important than the Nanaimo. Mr. hardson gives a number of carefully measured sections of the Comox a,* shewing its character along various parts of a line, which, owing the direction of the out-crop of the beds, is about thirty miles ength. On Brown's River, furthest north, almost the entire mass of Productive Measures is exposed, with a thickness of 739 feet 6 inches beds. In this section, nine coal-seams occur, with an aggregate kness of 16 feet 3 inches, the thickest bed being the lowest in the es, and averaging 7 feet. In a section of 122 feet at the Union e, ten coal seams, with an aggregate thickness of 29 feet 3 inches ur, the thickest seam being 10 feet. This section represents only a all part of the Productive Measures. In a third section, on Trent er,—again embracing nearly the entire thickness of the Productive asures,—thirteen seams are found, with an aggregate thickness of y 18 feet 1 inch, the thickest bed being 3 feet 8 inches. On the a of the Baynes Sound Company, in 220 feet 10 inches of measures, seams of 6 feet and 5 feet 10 inches, respectively, occur.

Mr. Richardson estimates the extent of country underlain by the Extent and value of this field. ductive Measures at 300 square miles, without taking into considera- n that which may lie beyond the shore, and not including the unex- red north-western extension of the field previously referred to.

Report of Progress, Geol. Surv. Can., 1872-3, p. 85 *et seq.*

Computing the total thickness of workable coal in the Union Compan property at a little over twenty-five feet, he calculates the quantity coal underlying the surface at 25,000 tons per acre, or 16,000,000 t per square mile for this part of the region.*

The operations now in progress in opening up mines in the Com area have been alluded to on a former page. The principal seam whi it is intended to work has been proved, by boring, to continue w good thickness for at least two miles in length.

Character of Comox coals.

The quality of the Comox coals is equal, if not somewhat super to that of those of Nanaimo. They contain but a small percentage water and the ash is also often very low. Several of them yield stro cokes. Proximate analyses of representative specimens are quoted the table at the end of this chapter (p 98 R). The following analy by Dr. B. J. Harrington may be quoted here, as probably represent the character of the main seam now being opened out for work. It of that which Mr. Richardson named the lower or ten-foot seam, whi shewed, where he examined it in the natural section, 7 feet 6 inches clean coal.†—

	Slow coking.	Fast coking.
Hygroscopic water.....	1·70	1·70
Volatile combustible matter.....	27·17	32·36
Fixed carbon.....	68·27	63·08
Ash.....	2·86	2·86
	100·00	100·00
Coke.....	71·13	65·94

Nanaimo coal-field.

The area of the Nanaimo coal-field is estimated at about 200 squa miles. There are at least two distinct seams of workable thickness this area, but in consequence of folds and faults it is not easy to the equivalency of beds in its various parts. Three collieries are present in operation here, the Nanaimo, Wellington and East Wellin ton. The works of the two first-named are on a very extensive sca embracing numerous shafts and inclines, provided with good machine railways and wharves. In the Vancouver colliery, the principal wo ings are upon a seam which averages from six to ten feet in thickne A second seam, overlaying the last, and separated from it by by 1 feet of sandstone, is seven feet thick. The seam worked in the W lington colliery averages about nine feet in thickness, and yields a rath dry steam coal which does not afford a strong coke. The coal fro the Vancouver colliery, on the contrary, gives a good coke and p duces a large quantity of illuminating gas

*Report of Progress Geol. Surv., Can., 1871-72, p. 80.
†Report of Progress Geol. Surv. Can., 1872-73, pp. 38, 76.

Several proximate analyses are summarized in the table at the end of this chapter. That of the Wellington coal by Mr. C. Hoffmann, may be quoted here in full, as illustrating the character of the larger part of the coal shipped.—* Character of Nanaimo coals.

	Slow coking.	Fast coking.
Hygroscopic water	2.75	2.75
Volatile combustible matter	30.95	38.03
Fixed carbon	59.72	52.64
Ash	6.58	6 58
	100.00	100.00
Coke	66.30	59.22

Weight of one solid cubic foot.....82.64 pounds.

Evaporative power, 13·41 pounds of water (at 100° C.) per pound of fuel.

Besides the coal-fields above described, Cretaceous coal-bearing rocks are known to occur in several additional places upon the shores of Vancouver Island. Mr. Richardson describes the occurrence of rocks of the coal series at the head of Alberni Canal which opens into Barclay Sound, and coal has been found in other localities on the west coast in the vicinity of Clayoquat Sound. The interior of the island being yet comparatively unknown, even geographically, it is not improbable that a geological examination may bring to light coal areas in the valleys and tracts of low country which may prove to be important. A great part of the folding which the rocks have experienced is of post-Cretaceous date, a fact which renders it quite possible that the layers of the coal-bearing rocks may be found folded into other synclinals besides these already known along the coast-line. Other coal-fields in Vancouver Island.

The character of the coals of Vancouver Islaud is illustrated by the analyses already quoted and by those in the comparative table (p. 98 R). Their superiority for all practical purposes to any others worked upon the Pacific Coast may be regarded as demonstrated, and is particularly evidenced by the higher price which they command, and by the fact that they are largely exported to California, and compete there successfully with coal produced in the United States, though handicapped by a duty of 75 cents a ton. General composition of Vancouver Island coals.

Dr. B. J. Harrington gives, as representing the average composition of the coals of Vancouver Island, as deduced from fifteen analyses by himself and Dr. T. S. Hunt, (chiefly from Nanaimo and Comox) the following.—†

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* Report of Progress Geol. Surv. Can., 1882-84, p. 37 M.

† Report of Progress Geol. Surv. Can., 1872-73, p. 79.

Total volatile matter	30.33
Fixed carbon	60.23
Ash	9.44
	100.00

Coals of Puget Sound.

Though numerous analyses of picked samples from mines in t vicinity of Puget Sound, in Washington Territory, can be quot which compare favorably with those of Nanaimo, the fact rema that those actually shipped in quantity from Puget Sound points h a distinctly inferior market value. This may in part be due to t large quantity of ash which these fuels often contain, a fact well ill trated in the tables of analyses in the U.S. Tenth Census.* On Pu Sound the greatest quantity of coal is shipped from Seattle and t ranks only as a lignite-coal affording no coherent coke. Of the follo ing analyses representing the character of the Seattle coal, the first quoted by Mr. Bailey Willis in the Census Report just cited,† t second is that given by Macfarlane.‡—

	I.	II.
Water	4·16	11·66
Volatile combustible matter	44·84	35·93
Fixed carbon	43·86	45·97
Ash	7·14	6·44
	100·00	100·00

Relative values of West Coast fuels.

As an impartial estimate showing the superiority of the Vancou Island coals, the following table establishing the comparative value these and other fuels for steam-raising purposes, by the War Depa ment of the United States, will be interesting.

One cord (8 feet by 4 feet by 4 feet) of merchantable oak wood there said to be equal to:—

	Pounds.
Nanaimo Coal (Vancouver Island)	1,800
Bellingham Bay Coal (Washington Territory)	2,200
Seattle Coal (Washington Territory)	2,400
Rocky Mountain Coal (Wyoming, &c)	2,500
Coos Bay Coal (Oregon)	2,600
Mount Diablo Coal, (California)	2,600

The following statement of the weights of steam obtained as t result of working tests from a cubic foot each of various fuels, at a sl rate of combustion, may also be referred to. The water to be evaporat had first been raised to a temperature of 212° F. The experimen

* U.S. Tenth Census, vol. xv, pp. 776-780.
† p. 761.
‡ Coal Regions of America, Third Edition, p. 569.

e made by the Chief Engineer of the U. S. Navy Yard at Mare nd.*—

	Pounds of Steam.
Nanaimo coal	372·64
Rocky Mountain, Monte Diablo, Coos Bay and Seattle	319·98

Though rocks of Cretaceous age occur on the mainland of British Columbia, and especially in the little-known northern portion of the Province characterize extensive tracts, they have not generally been found to contain coal. It may be stated, however, that specimens of good coal have been obtained from these rocks in the region of the Upper Skeena, (p. 150 R) on the western, or British Columbian side of the water-shed in the Rocky Mountains in the vicinity of the Crow Nest Pass, and in the country adjacent to the Peace River; and that it is probable that many further discoveries of the same kind still remain to be made. Cretaceous coals on the Mainland.

The coals of the Crow Nest Pass, first described by the writer in the Annual Report of the Geological Survey for 1885, (p. 69 B) have since attracted some attention, and have been to some extent explored and opened up. The Cretaceous basin or trough in which they occur is somewhat extensive, and resembles in general character those which occur on the opposite side of the Rocky Mountain water-shed, beyond the limits of British Columbia, in one of which the Cascade anthracite is included. The age of these Cretaceous rocks appears to be nearly the same with that of those of the Queen Charlotte Islands. By the 'prospecting' work which has lately been executed in the Crow Nest Pass, the existence of no less than fifteen workable seams is said to have been determined, two of which are reported as fourteen and thirty feet respectively in thickness (see p. 97 R). An analysis of coal from the thickest of these, (known as the "Jubilee Seam") by Mr. Hoffmann gave:—† Coals of Crow Nest Pass.

Hygroscopic water	1·79
Volatile combustible matter	25·45
Fixed Carbon	69·14
Ash	3·62
	100·00

On the Upper Skeena and its tributaries, Cretaceous rocks, again believed to be of the same age with those of the Queen Charlotte Islands, are extensively developed. One specimen of excellent coal has been obtained from them, at a place about eighteen miles up the Coal-bearing rocks of Skeena.

* Ex. Doc. No. 206. 2nd Session, 42nd Congress. p. 36.
† Annual Report Geol. Surv. Can., 1887, p. 12 T.

Watsonkwa, and impure coals have been noted in several localities. is by no means improbable that an extensive coal-field exists here.*

Coals on Peace River.

To the north of the 54th degree of latitude, the eastern boundar British Columbia follows the 120th meridian, and the Province th fore, includes a portion of the coal-bearing region of the Peace Ri Here, mineral fuels are known to occur at two distinct horizons, being well down in the Cretaceous series, the other probably of Lara age. Some of the fuels are true bituminous coals and others ligr coals. The limited amount of exploration yet carried out has not sulted in the discovery of any very thick seams to the west of the 12 meridian, but the region is still, for the most part, practically unkn in detail.†

Coal and Lignite of the Tertiary.

Tertiary fuels.

The Tertiary rocks of British Columbia occasionally contain t coal, but more usually afford only brown-coal or lignite. Most of th rocks, as already noted, are assigned with probability to the Mioc period, but some of them, particularly those of the vicinity of Fraser estuary, may be referable to the Laramie, to which stage greater part of the coal- and lignite-bearing rocks of Puget Sound now presumed to belong. ‡

Fuels of Puget Sound, etc.

At Bellingham Bay, a short distance south of the Internatio boundary, lignite was discovered about 1851, and in 1869, 20,500 t were shipped to San Francisco, but the mines were closed down, ow to the inferior quality of their product, in 1878. Lignite-coals of same age, or but little older, are now very extensively worked, howev in the vicinity of Seattle, and in the Wilkinson coal-field, furth southward, as well as to the eastward, near the borders of the Pu Sound coal region, where the better classes of fuels previously adverted occur. Some of these are, however, probably referable to beds ol than the Laramie or of true Cretaceous age.

Fuels of Burrard Inlet and Lower Fraser.

The interest of these facts, in the present connexion, lies in t circumstance that the Tertiary or Laramie coal-measures of Pu Sound and Bellingham Bay are continuous north of the Inter tional boundary, and must underlie nearly 18,000 square miles the low country about the estuary of the Fraser and in the low part of its valley. Lignite has been found in association w these rocks at Burrard Inlet and other localities, and specime of a fuel resembling true bituminous coal (and coking on t

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* Report of Progress Geol. Surv. Can., 1879–80, p. 104 B.

† See Report of Progress Geol. Surv. Can. 1879-80, p. 134 B.

‡ See Report of Mr. Bailley Willis, U.S. 10th Census. vol. xv, p. 769. Also Dr. C. A. Wh on the Puget Sound Group, Am. Journ. Sci., vol, xxxvi. Dec., 1888.

lication of heat) have been obtained near the Fraser above New stminster. The remarkably good specimen of coal from the River lliwack, of which an analysis, by Dr. Harrington, is given on page of the Geological Survey Report for 1873-74, is probably from this es. The seams yet discovered are quite thin, but the low ntry underlain by the formation is deeply covered with drift and vium, and exposures are few; so that boring operations will be neces- y before the existence or otherwise of workable seams of coal or nite can be demonstrated in this region. Some particulars bearing this problem, by Mr. Amos Bowman, may be found in the Summary port of the Geological Survey for 1888 (p. 8), and notes on the e important localities are given at some length on a later page of sent report (p. 147 R).* The thickness of Tertiary rocks of which e or less complete exposures occur, is estimated at about 3000 feet.

s probably indicative of the character of some of the fuels to be found the Lower Fraser region, the following analysis of that of Belling- n Bay may be quoted. †— Value of these fuels.

Hygroscopic water	8.39
Votalite combustible matter	45.50
Fixed carbon	33.26
Ash	12.66
	100.00

f fuels of this character, in beds of workable thickness, should be nd to occur in the strata underlying Vancouver or New Westminster, time has now arrived when they might be utilized on a large scale local purposes, even though not so well suited as the coals of naimo and Comox for purposes of export.

Tertiary rocks holding lignite are found fringing other parts of the st in greater or less width. They occur near Sooke,‡ and at various ces on the south-west coast of Vancouver Island, and form a large t of the northern portion of the Queen Charlotte Islands. Partic- r references to the principal places in which lignite is found, are en on a later page (p. 145 R), but with the exception of the Lower ser region, none of these localities can be considered as of present portance, in view of the existence and accessibility of the superior ls of the Cretaceous. Lignites of the Coast.

Rocks of Tertiary age are known to cover great tracts of the interior British Columbia, and it can now be shown that in most places the izontal, or slightly-inclined basaltic and other igneous flows of the Tertiary coal- and lignite-bearing rocks of the Interior.

See also Report of Progress Geol. Surv. Can. 1876-77, p. 188.
Coal Regions of America, Macfarlane. Third Edition, p. 577.
Report of Progress Geol. Surv. Can. 1876-77, p. 190.

interior plateau, are attached to, and form the latest rocks of the ligni or coal-bearing series of the Tertiary. From this fact, and the kno relations of the beds in a number of localities, it is highly proba that sedimentary Tertiary deposits underlie a great part of the ar where only the later igneous rocks are seen at the surface, and in ma places where extensive exposures of these Tertiary deposits occ more or less coal or lignite has been found in association with the Very roughly, in our present comparatively slender knowledge of region, it may be estimated that this formation occupies between t 54th and 49th parallel of latitude, an area not less than 12,000 squ miles.

Nicola River and Coldwater.

In the Nicola Valley, near the mouth of the Coldwater, the occ rence of coal has been known for some years. The average of t determinations, by Dr. Harrington, gave the following result.—*

Volatile combustible matter and moisture	36·065
Fixed carbon	61·290
Ash	2·645
	100·000

The seam from which the above specimen was derived, has a thi ness of nearly five feet, and is the lowest exposed. Other seams occ ring higher in the series approach lignites in composition. The roc containing these fuels are chiefly yellowish sandstones, which p beneath massive volcanic accumulations, and are not well expos except in the vicinity of the mouth of the Coldwater, though the ov lying volcanic series extends along the Nicola to its confluence wi the Thompson, or for about thirty-seven miles. This locality is t most promising one yet found in connexion with the Tertiary of t Interior. Similar rocks to those here containing the coal are a found to extend far up the Coldwater, and though not satisfactori exposed, are known to contain more or less coal.†

Kamloops and Thompson River.

The lower beds of the Tertiary are again found to contain coal at place within three miles of Kamloops. The fuel is of a bitumino character and of good quality, but the seams so far found are less th a foot in thickness. Coal also occurs in the same position, about fort five miles up the North Thompson, but here again the seams yet d covered are thin.‡

* Report of Progress Geol. Surv. Can., 1876-77, p. 465. Another analysis made from specim subsequently collected is given in the table. (p. 98 R.)

† See Report of Progress, Geol. Surv. Can., 1877-8, p. 123 B.

‡ Summary Report Geol. Surv. Can., 1888, p. 4. Report of Progress, Geol. Surv. Can., 1877- p. 113 B.

Lignites or brown-coals are found abundantly in other parts of the Other localities of lignites.
tiary formation. On Hat Creek, near Marble Cañon, a bed of this terial surpasses forty feet in thickness, and important deposits also ur on the North and South Forks of the Similkameen. The lignites l lignite formation of Quesnel are described in the reports of the vey,* but the lignites here are, I believe, of no economic value. ey are mixed with clayey matter, and are otherwise poor in quality; l are, apparently, the result of the rather tumultuous deposition of ft-wood and other vegetable matter, by rapidly-moving waters. gnite of better quality, and apparently, in some instances at least, l resting in the locality where the wood producing it grew, is, however, found in other places, which are enumerated on later pages.

These lignites do not, of course, compare favorably as fuels with the Value and extent of lignites.
l of the Nicola valley or with those of the Cretaceous, and would rcely be of value, unless found in thick and accessible seams, and then y for local use or in the absence of other fuels. Comparatively little is known about their distribution, for though, as already stated, they bably underlie a great part of the basaltic plateau, the soft character the associated beds allows them to be easily worn away, leaving lows into which the basalts and other hard overlying volcanic ks, readily crumbled by the weather, fall, concealing the lignite -crops.

The subjoined table of proximate analyses gives, in summarized form, Table of analyses.
results of a number of examinations of British Columbian coals l lignites. The references are to the published reports of the ological Survey, where additional particulars with respect to these ls may be found. The analyses selected are almost exclusively those of rked or workable seams. They shew, as already mentioned, that the ls of the Province as a whole include all varieties, from anthracite ignite, and that many of them are of a very high class.

Analysis No 15 represents a fuel from a group of seams of the same Gas-coal.
racter, lately discovered in the coal-bearing series of the Crow Nest ss. The seams are reported to run from 4 to 7 feet in thickness. e specimen of which the assay is quoted, yields no less than 57·71 cent. of volatile combustible matter by fast coking, resembling a e cannel in its behaviour on heating, and constituting a very excelet gas coal.

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ee Reports of Progress, Geol. Surv., Can., 1877-78 pp. 121 B., 130 B., 132 B.; 1871-72 p. 58; 187 6. 257.

Table of Proximate Analyses of Coals and Lignites from the Province of British Columbia.

	LOCALITY.	By slow or fast coking.	Hygroscopic water.	Volatile combustible matter.	Fixed Carbon.	Ash.	Reference.
	(Cretaceous.)						
1	Cowgitz, Queen Charlotte Islands. "Six-foot seam"	F.	1.60	6 55	83.09	8.76	1872-73 p. 81.
2	Ya-koun River, between Skidegate and Masset Inlets. Queen Charlotte Islands	F.	2.65	30.59	61.33	5 43	1887 p. 17 T.
3	Cool Harbour. Koskeemo. Quatsino Sound. Three-foot seam	F.	1.05	34.38	54.01	10.56	1887 p. 16 T.
4	Suquash. N.E. Coast of Vancouver Island	F.	5 03	41.51	46.52	6.94	1887 p. 19 T.
5	Trent River. Comox. 3 ft. 8 in. seam	S.	0.97	25.09	66.42	5.95	1872-73 p, 77.
6	Union Claim. Comox. 4 ft. 4 in seam	S.	1.34	28.11	67.72	2.83	1872-73 p. 77.
7	Union Claim. Comox. Lower seam, 7 ft. 6 in	S.	1.70	27.17	68.27	2.86	1872-73 p. 76.
8	Bayñes Sound Mine. Comox. Richardson seam	S.	1 18	34.13	48.51	16.18	1876-77 p. 468.
9	Wellington Mine, Departure Bay. Nanaimo	S.	2.75	30.95	59.72	6.58	1882-84 p. 37 M.
10	Upper seam. Nanaimo	S.	29.30		55.75	14.95	1871-72 p. 99.
11	Newcastle Island. Nanaimo. Upper seam 3 to 4 ft.	S.	1.57	31.77	58.03	8.63	1872-73 p. 80.
12	Newcastle Island, Nanaimo. Lower seam 4 ft.	S.	35 49		52.57	11 94	1871-72 p. 99
13	Peter seam. Crow Nest Pass	S.	1.79	25.45	69.14	3.62	1887 p. 12 T.
14	Jubilee seam. Crow Nest Pass	S.	1 89	24 88	68.86	4.37	1887 p. 14 T.
15	Seam X., Crow Nest Pass	S.	2.10	44.41	43.63	9.86	
16	Watsonkwa R., 18 miles above Skeena Forks	S.	0.85	39.67	57.51	1.97	1878-79 p. 14 H.
17	The Cañon. Peace River	S.	2.10	21.54	71.63	4.73	1875-76 t. p. 70.
18	Pine River, five miles above the Lower Forks, Peace River District	S.	2.45	27.87	54.58	15.10	1882-74 o. 39 M.
	(Tertiary or Laramie.)						
19	Near Chilliwack R., about 5 miles from Fraser R.	F.	35.73		63.86	0.41	1873-74 p. 99.
20	Mouth of Coldwater River. Five-foot seam	S.	4.45	29.68	57.16	8.71	1876-77 p. 466.
21	Mouth of Coldwater River. Fifteen-foot seam	S.	5.78	27.65	53.69	13 88	1877-78 p. 48 G.
22	Upper Nechacco, South of Fort Fraser. Four-foot seam	S.	10.46	35.01	49.64	4.89	1876-77 p. 467.
23	Kohasganko Stream. South of Tanyabunkut L. Four-foot seam	S.	9.90	37.71	38.85	13.54	1877-78 p. 48 G.
24	N. Thompson. 45 miles above Kamloops	S.	2.84	33 56	52.03	11 57	1876-77 p. 466.
25	Hat Creek. Forty-foot seam	S.	8.60	35.51	46.84	9.05	1877-78 p. 47 G.
26	Lewes River. Lot 62° 15′ Long. 136° 25′	F.	6.03	36 92	49 03	8.02	1887 p. 11 T.

IRON.

Comparatively little attention has yet been given to iron-ores in Utilization of ores of iron.
itish Columbia, in consequence of the impression that under the esent conditions they possess little or no value. This is no doubt e case with those which are at a distance from the sea-board and mote from means of communication, but the time should not be far stant when such deposits as lie near navigable water, by which com- unication with the coal-fields may be had, can be utilized extensively the manufacture of iron.

Most of the ores of iron so far found in quantity, are magnetites, which Character of ores.
cur in association with the older metamorphic rocks of the Province. ay iron-stones are, however, of frequent occurrence in the coal ries of Vancouver and Queen Charlotte Islands as well as in the rtiary rocks of the Interior. These might, no doubt, in some cases, profitably worked in conjunction with the coal-seams, as they occur the same strata, and in some instances are even associated with the al. The nodules vary in weight from a pound or less up to several ns, and Mr. Richardson says that at the Baynes Sound mine, a fficient quantity might probably be obtained for the regular supply a blast furnace.*

The only iron-ore deposits which have yet been worked, are those of Texada Island
e south-west side of Texada Island, the largest exposures of ore curring about three miles north-west of Gillies Bay. Here the ore- ass is seen to be from twenty to twenty-five feet thick, and consti- tes a somewhat irregular contact-deposit between limestone or marble d granite, thin veins of the ore being occasionally found reticulating e limestone. From this point to the northward, for nearly a mile, e ore is occasionally seen, and at one place there is a continuous posure about 250 feet long and from one to ten feet thick. As gards mining and shipment, the ore is most favourably situated; hile in the event of smelting operations being undertaken on the ot, there is an abundance of wood suitable for making charcoal on e island, and Comox Harbour, from which the coal of the Comox ea may be shipped, is less than twenty miles distant.†

The ore is a magnetite of excellent quality. A partial analysis by Analyses of ore
r. B. J. Harrington, in the laboratory of Survey, shewed 68·40 per nt. of iron, with only ·003 per cent. of phosphorus. A partial alysis by Whitfield,‡ representing a lot of 600 tons, shews iron

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*See remarks by Dr. B. J. Harrington, in Appendix iii, to Mr. Richardson's report. Report of ogress, Geol. Surv. Can., 1872-73, p. 82.

† For details see Report of Progress, Geol. Surv. Can., 1873-74, p. 99. Annual Report Geol. rv. Can., 1886, p. 36 B.

‡ U. S. Tenth Census, vol. xv, p. 580.

65·71, phosphorus ·013. A more detailed analysis carried out b Messrs. P. C. Gilchrist and E. Riley, on specimens sent to the Colonia and Indian Exhibition in 1886, is as follows.*—

Iron	69·85
Manganese	trace
Siliceous matter	2·75
Sulphur	·06
Phosphoric acid	trace
Moisture	trace

Mining of the ore.

At the principal deposit of ore, situated as above described, a whar has been built, and excellent arrangements made for mining and ship ping. The ore is brought to the wharf by an incline nearly a quarte of a mile in length, from the point at which it is quarried out, about 25(feet above the sea-level. Considerable quantities of ore have bee shipped from time to time to the works of the Puget Sound Iron Com pany, situated at Irondale, W. T. The Texada ore is there mixed wit from one-ninth to three-tenths bog-ore, found near Irondale, and pro duces thus, or when smelted alone, an excellent quality of foundry pig

The shipments in 1885, amounted to 190 tons; in 1886, 3941 tons in 1887, to 1410 tons; and in 1888 to 7300 tons, valued at $18,400.†

East side of Texada.

Iron-ore deposits of the same character, and in considerable mass are again found on the opposite or north-east shore of Texada Island and very probably are more or less continuously developed along th contact of the granites and limestones elsewhere in the island.

Sooke.

Magnetic iron-ores of somewhat similar character occur in the hill to the east of Sooke Harbour, Vancouver Island. The deposits are o Sections 79 and 83, Sooke district, at a distance of about twenty mile from Victoria, near the coast, and well situated for shipment The deposit is rather of the nature of a *stoke-work* than a tru vein, but can be traced for some distance in a N.E.-S.W. direction and in places shews from ten to twenty feet of nearly pure ore. Th country-rock is a coarsely crystalline diorite (?), containing muc hornblende. The following assays of various specimens of the ore giv the percentage of metallic iron.—

Analyses of the ore.

Wm. Julian, San Francisco	72·40
Thos. Price, " "	51·80
" " " "	57·30
J. T. Bernige, Cornwall	48·90
" "	68·50
J. Kestle & Co., San Francisco	64·50
D. Wallace, Glasgow	61·50
" "	65·00

* Journal of the Iron and Steel Institute, 1886, p. 561.

†Tons of 2240 lbs.

Magnetic iron-ore occurs in considerable mass in the Queen Charlotte Islands, on the east side of the entrance to Harriet Harbour, Skidegate Inlet. No attempt has, however, yet been made to utilize this ore. Occasional strings of pyrites traverse the ore, but it is, as a rule, remarkably pure. Specimens of an average character, collected by myself in 1878 and examined in the laboratory of the Survey, proved to contain 58·06 per cent. of metallic iron, while an exceptionally good fragment yielded 69·88 per cent.* Queen Charlotte Islands.

Very pure specimens of magnetite have also been brought from an island in the Walker group, in Queen Charlotte Sound, near the north end of Vancouver Island. These proved to contain 71·57 per cent. of metallic iron. Another specimen of a similar ore, comes from a deposit, which is reported to be extensive, on the north side of Rivers Inlet, about twenty-five miles up from its entrance. Numerous other localities of iron-ores will doubtless be found when sought for. Such additional occurrences on the coast as appear to be worthy of mention as well as those known in the inland portions of the Province, are enumerated further on. (See p. 151 R.) Other localities

Copper.

Copper-ores are known to occur in many places, over the entire area of British Columbia. They were among the first to attract notice at several localities on the coast, and during the early years of the Province, various irregular and uncertain attempts were made to open up copper-mines, but none of these resulted advantageously to the promoters, and no copper mining has yet been initiated in British Columbia. Copper-ores in smaller quantity are very frequently found in little veins and joints in the altered volcanic rocks of the Vancouver series, extensively developed on the coast, as well as in the similar rocks of the interior of the Province. Hundreds of such localities have been observed, but only a small proportion of them can be considered at all promising. Such occurrences, however, should receive the attention of the prospector where met with, as the copper-staining of rock-exposures is sometimes the most obvious indication of the presence of ores of the precious metals. Occurrence of copper-ores.

It is further impossible to draw a distinct line between deposits which are to be regarded as ores of copper and those which hold sufficient gold or silver to entitle them to be classed as ores of the precious metals. In consequence of this fact, a number of metalliferous deposits which might with equal propriety have been included here, have already received mention in the pages devoted to the precious metals, to which reference should be made. Thus the Toad Mountain Copper-ores of the interior country.

*Report of Progress, Geol. Surv. Can., 1878-79, p. 54 B.

ores, though owing most of their value to silver, contain, i specimens assayed, from 25 to 47 per cent of copper. The ores c Jubilee Mountain, on the Upper Columbia valley, are again very ric in copper, and some of them in which the percentage of silve is low, must be regarded rather as copper-ores. Copper-pyrites als occur in some quantity in the Stump Lake ores and in those of severa other places previously described. A deposit of copper-pyrites whicl appears to be of importance, is that owned by the B.C. Copper Minin Company, on the upper part of the South Similkameen. Anothe discovery of grey copper-ore, reported to be extensive, has late been made between Rock and Boundary creeks.

Howe Sound. In the vicinity of the coast, the copper deposit which has receive most notice, is situated near the head of Salmon Arm of Jarvis Inle and between that inlet and Howe Sound. This is owned by the How Copper Mining Company. The ore is chiefly bornite or purple coppe and the deposit is not far from the coast, but at an elevation of 300 feet above sea-level. It was discovered about 1874, and was worked a intervals between the years 1877–83, though rather with the view o developing the property than for the actual extraction of ore for ship ment. Three levels have been driven on veins which are reported t be from 2 feet 6 inches to 3 feet 6 inches in width. Assays have shew 58 per cent of copper and 50 ounces of silver to the ton. An assay of a average specimen, in the laboratory of the Geological Survey, shewe 40 per cent of copper. The veins traverse granitic rocks like thos generally met with in the Coast Ranges.

Texada Island. Some exploratory work has also been done on a copper deposit o promising appearance situated on the north-east shore of Texad Island, at the contact of marbles with an intrusive mass of granite The ore is copper-pyrites, mixed with iron pyrites, and much of it i of very good quality. A specimen collected by myself and submitte to assay in the laboratory of the Survey, contained in addition to cop per 10·20 ounces of silver to the ton.* The mining operations at on time attempted at Skincuttle Inlet, Queen Charlotte Islands, in searc of copper, do not appear to have been warranted by the comparatively small quantity of copper-ore apparent there, and led to no good result.†

Queen Charlotte Islands.

Sooke. A somewhat peculiar deposit of copper, upon which a shaft wa sunk, was discovered near Sooke, on Vancouver Island in 1864 The copper here occurs in the native state, as thin leaves quite apparen to the eye, traversing green chloritic or diabase rock. A specime subjected to assay, however, proved to contain but 1·02 per cent. o copper.‡

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* Annual Report Geol. Surv. Can., 1886, p. 34 B.

† Report of Progress Geol. Surv. Can., 1878-79, p. 53 B.

‡ Annual Report Geol. Surv. Can. 1886, p. 19 T.

Masses of native copper have been found from time to time in vari- Native copper.
s parts of the Province, and nuggets and scales of the same material
ve been obtained in sluices-boxes in the course of gold-mining in a
mber of places, occasionally in notable quantity. Native copper
the amount of half a ton, obtained in this way from Quesnel River,
ar the Forks, was some years ago sent down to Victoria and sold
ere. None of these occurrences of native copper have yet been
aced to their sources, but they may very probably be derived from
cks originally of volcanic origin in beds of which copper may be
und to be distributed.

In connexion with the mining of the precious metals, the out-put of Copper out-put
pper from British Columbia is likely before long to become consider-
le, and it is only a question of time till copper-ores shall be worked
such in the Province.

Such localities of occurrence of copper as appear to be of interest
e enumerated on pages 152 R to 155 R. In this connexion the list of
says of ores of the precious metals (pp. 76 R to 79 R) should also be
ferred to.

Lead.

As already explained, a large proportion of the silver-ores lately Association of lead and silver.
scovered and now in course of development in the Province, are
gentiferous galenas, from which it is evident that so soon as these
es are extensively worked, the Province will become a lead producer
a notable extent. In consequence of the constant association of
lver and lead, it has been thought best to include references to lead-
es, for the most part, under the head of silver. In the ores of Mount
tephen or Tunnel Mountain, on the Canadian Pacific Railway, and
ose of Hendryx Camp, on the east side of Kootanie Lake, may be
entioned as important occurrences of galena in which the value of
e lead bears a considerable proportion to that of the contained silver.
oth these deposits are now being opened up and shipments have already
een made from the first-mentioned place to the smelter lately
stablished at Vancouver. Deposits of galena which is not rich in silver,
equire to be situated within easy reach of means of transport or
arkets, before they can be assumed to possess any immediate value.

Zinc.

Zinc blende is frequently found as an accessory mineral in the veins Zinc blende.
lassed as those of the precious metals, as will be seen on reference to
he table of assays on pp. 76 R to 79 R. No deposits of the ores of this

metal which possess economic importance as sources of zinc have, ho ever, yet been found in British Columbia.

Antimony.

Stibnite.

Several occurrences of stibnite or sulphide of antimony are know in the southern part of the Province, which may prove to posse economic value. Antimony also occurs in small quantities, in com nation, in a number of argentiferous ores, but can in such cases regarded only as an impurity.

Platinum.

Localities yielding platinum.

The occurrence of platinum in association with placer gold is freque in several parts of the Province, and is alluded to in connexion with tl enumeration of localities of gold-mining, in a number of cases. (S pp. 115 R to 144 R.) The metal occurs in notable quantity in the region the Upper Similkameen and Tulameen, in minute scales where tl gold is 'fine' but increasing in coarseness to small pellets ar nuggets in places where 'coarse' gold is found. Coarse grains ar pellets of platinum have so far been found only on Granite, Cedar ar Slate creeks, all entering the Tulameen on the south side. In certa claims on these creeks, the platinum has been found to equal half th weight of the gold obtained. It is estimated that from 1400 to 20(ounces of platinum were obtained in this district in 1887, and abo 1500 in 1888.

Character of the platinum and its value.

Though above referred to as platinum, the metal so named is alloye with several other metals of the same class, of which osmiridium is th most abundant. Specimens of the native platinum from Granite Cree have been subjected to careful examination and analysis by Mr. Hof mann, who states that the material "having the composition of the o here in question would, at this present time, be worth from $2·90 t $3·65 per ounce, troy, in the English market." Osmiridium is em ployed, on account of its great hardness, for tipping the nibs of gol pens. "For this purpose it is necessary that it should be in the for of natural grains, and these are very carefully selected, the require ments being that they should be solid, compact and of the proper siz and shape." This was not, however, found to be the case with tha present in the platinum from Granite Creek.*

Probable source of the platinum

Platinum has very rarely been discovered in veins or otherwise in it original matrix, and in the Ural Mountains, whence the greatest quan

* Annual Report Geol. Surv. Can., 1886, p. 57 T.

ies are obtained, it is almost always found, as in the cases above ed, in association with gold-bearing alluviums. In the northern rt of the Government of Perm, however, it has been noted in a few nces with little or no accompanying gold, and it then appears to be rived from rocks consisting of serpentine and peridotite with talcose d chloritic schists and chromite. While there is a notable abundance greenish, chloritic, and hornblendic schists and diabase rocks, (result- g from the metamorphism of old volcanic rocks) in the Tulameen and per Similkameen region, and chromite and magnetite are here found the workings in association with the platinum and gold, no peridotite serpentine is actually known to occur. The circumstances in connexion th the occurrence of the 'coarse' platinum appear to point to the cinity of an important mass of intrusive diorite as its point of origin. great part of the associated magnetite is certainly derived from veins this rock, and it seems not improbable that the platinum, and possibly o a great part of the gold of this district, may occur in scattered ains in this intrusive mass, (compare p. 128 R). Very little vein-stuff curs in the gravels with which the platinum and gold of this region e associated.

Importance deposits.

It may be added here, that the platiniferous region of the Upper milkameen and Tulameen, is the most important as yet discovered North America. Mr. David T. Day states, that owing to the rise in ice of refined platinum, considerable enquiry for the crude material curred in 1887, and that in consequence of enquiries for that material stituted in the West, a total quantity of 448 ounces of platinum was rchased, this being set down as the entire yield of the United States. rt of this platinum came from various places in Oregon, but a portion stated to have been derived from British Columbia, and doubtless, m the region here referred to, as shipments were not made from other aces in which very small quantities only are met with. The average ice paid for this crude platinum was, according to the figures given, out $4 an ounce.*

Mercury.

Occurrence of cinnabar.

It has already been stated (p. 12 R,) that no important deposits of es of mercury have yet been discovered in British Columbia. Some eces of cinnabar have been found in several places, and on the omathco River and Wapta (Kicking Horse) River this ore has been nd in place, but apparently in neither locality in workable quantity. ercury is mentioned as appearing in globules in the native state in me parts of the silver-ore of Silver Peak, near Hope, and it also occurs combination with silver in the mineral arquerite previously noted.

* See Mineral Resources of the United States, 1887, pp. 2, 142.

Arsenic.

Native arsenic. Native arsenic has been noted in one localtity, where it apparen occurs in considerable mass, to the west of the Fraser River, a sh distance above Lillooet. Elsewhere it is known only as a relativ unimportant constituent in mixed ores.

Molybdenum.

Molybdenite. Molybedenite, or sulphide of molybdenum has been observed ir number of localities, but usually in small quantities only. Th localities are situated for the most part in or near the Coast Rang Fine specimens have, however, been brought from the head of Sp zum Creek, west of the Fraser, which may indicate the existence o deposit of economic importance.

Structural Materials.—*Building Stones.*

Supply of building stones. Such demand as has up to the present time occurred for building-sto in various parts of the Province, has, as a rule, been satisfied with much difficulty. It may be stated, however, as a somewhat pecul feature, that over a great part of the Interior Plateau, the rocks h been subjected to so much stress, and have been so completely crush and jointed in consequence of disturbance subsequent to the period their partial or complete induration, that homogeneous stone, suita for masonry, is there notably scarce over considerabe areas.

Building stones of the coast. On the coast, building stones of excellent quality are met with in t greatest abundance. These consist of granites and granitoid rocks the Coast Ranges, and of sandstones and freestones of Cretaceous a Both varieties may frequently be quarried at the water's edge with cellent facilities for shipment. Marbles, suitable for purpose of co struction, are also found in several places, and in situations equa advantageous.

Victoria. At Victoria, a considerable quantity of good grey granite has be obtained from the large travelled boulders, which at one time existed abundance in the vicinity of the city. Granite from the Nels Island quarry, Jarvis Inlet, has also been employed to a limited exte and Cretaceous sandstone from the vicinity of Nanaimo and elsewhe has been used in considerable quantities. The greater number of t permanent structures are, however, built of brick, of fair quality, whi is manufactured from a sandy clay, of marine origin, which overlies t oulder-clay to a depth of from five to fifteen feet.

the construction of the dry-dock at Esquimalt, the greater part of stone employed was a greenish-grey sandstone of Cretaceous age, rried extensively for the supply of this work, on Admiralty or Salt ing Island. For portions of the work requiring greater strength, granite of Nelson Island was used. Stone used in dry-dock.

or Vancouver, the principal building-stone is a very excellent grey nite, quarried on the North Arm of Burrard Inlet, at the water's e, and lightered thence to the city. Brick is, however, extensively l here and at New Westminster. It is manufactured from clays ilar to those of the neighborhood of Victoria, which have like those e used, a red colour. Vancouver.

he granites so far met with in favorable positions for quarrying in vicinity of the coast, are generally grey in colour and more or less blendic. Some excellent stones of a pinkish-grey colour (like that Nelson Island) also occur. Most of these granites and granitoid ks are susceptible of a high polish. No distinctively red granites of d quality have been observed in mass or quarried. Granites.

he quantity and quality of the granites of the coast region is such, en in connexion with their accessibility, as to suggest that they ere long become the basis of an important industry, and that they be quarried, not alone for home use, but for export to other places favorably situated in respect to building-stones.

he greater facility with which the sandstones of Cretaceous age be worked, renders them more appropriate for certain classes of dings, and from a commercial point of view, they may be regarded at least equally important with the granites. Among the coal- ring rocks of Newcastle Island, Nanaimo, there are beds of brownish- y sandstone, which afford excellent material for building and flag- g. The upper beds are of the best quality, and it was from of these that Mr. E. E. Emery, of San Francisco, obtained the e for the construction of portions of the mint in that city. Blocks pillars were taken out, which, after dressing, were twenty-seven six inches in length, and three feet ten inches in diameter. Flag- nes, with even surfaces, as much as ten feet square, have also been ained, and are easily quarried. These sandstones have also been em- yed for the mannfacture of grindstones to a limited extent, and e beds are believed to be well suited for this use. Sandstones.

he marbles of Texada Island and of other localities easily reached sea, must also be regarded as possessing considerable value for inary building purposes. Several of these take an excellent polish, are already in use, to a small extent, for the manufacture of monu- nts. The known marbles generally range in colour from grey to ite, and include some very handsome mottled and clouded varieties. Marbles.

So little enquiry has, however, yet been made for marble, that i highly probable that many additional varieties remain to be found.

Building stones of the interior.

Building-stones situated at a distance from the coast or from the of railway must, of course, be considered as possessing no pre value. On that part of the railway which traverses the Coast Ran as far inland as North Bend, grey granites of the kind just noted, well situated for quarrying, are of frequent occurrence. Granite this character, obtained in the immediate neighborhood, were emplo in the construction of the piers of the great cantilever bridge ac the Fraser. Further inland, building-stones of good quality are sel met with near the railway, till the Shuswap Lakes are reached, bu would appear that the silts abundantly developed in banks along rivers, and forming the latest deposit of the glacial period, are suited for the manufacture of brick.

Quarries.

On a subsequent page a number of localities are enumerated in wh quarries have been opened, or which present all the conditions ne sary for the successful quarrying of good stone. In this list, spe prominence is given to the southern part of the coast of the Provi and to places on the line of railway. It may indeed be stated t localities not included in one or other of these categories are omit as, with rare exceptions, such cannot be regarded as of any immedi value.

Slate.

The existence of slate of good quality and easily fissile in large faces, has not, so far as I am aware, yet been proved in any par the province of British Columbia, though reported in several pla particularly at a place six miles and a half east of Golden, on the C. Ry. line.

Ornamental Stones.

Materials susceptible of high polish.

Under the head of ornamental stones, such materials as are susce ble of employment in architecture for decorative purposes may classed. These would include many of the granites and granit rocks susceptible of a high polish, together with the marbles, previou referred to. Porphyries, diorites, etc., may also be included here, a these are found in great variety of colour and texture in various pa of the Province. Slabs of a porphyrite-breccia obtained by Mr. Ri ardson in the Ballinac Islands were found to take a very fair polish, few experiments have yet been made toward the utilization of su materials. The serpentines which occur in many places in the inter of the Province, can scarcely be regarded as of value for such p poses, as most of them are too much jointed and disturbed to aff blocks or slabs of useful size, free from flaws. They differ in t respect very markedly from the serpentines of the Eastern Townsh of the province of Quebec, some of which afford excellent verd-antiq

Limes and Cements.

Importance attaches also to places in which limestone of good qual- Sources of supply.
and well situated for the manufacture of lime and its shipment
rs. Victoria is at the present time chiefly supplied with lime
San Juan Island, W. T., and from Saanich; for though lime-
e occurs in several places in the immediate vicinity of the city,
generally of an impure and siliceous character. Vancouver also
es the greater part of its supply from the San Juan quarries.
his connexion, I think attention cannot be too strongly drawn to Opportunity for work.
fact that pure and excellent limestone, which often assumes the
acter of marble, occurs in the northern part of Texada Island in
e unlimited quantity, and that this island is scarcely less accessible
vater than San Juan, and possesses the additional advantage of
cimity to the coal-fields of Nanaimo and Comox. There appears to
n excellent opening here for an important industry. The best
es for work and shipment on Texada Island are Marble Cove, on
aspina Strait, three miles from the north end of the island, and
shall Bay, at the northern extreme of the island.

s entire groups of mountains and hills to the east of the Coast Great abundance of lime.
ges are frequently composed of limestone, it is naturally impossi-
to enumerate localities of occurrence of this material generally
ughout the Province. It has, however, been considered advisable
nention, on a subsequent page, a few places which from their situ-
n are regarded as of importance, and which have come under my
notice.

Hydraulic limestone, useful for the manufacture of cement, has not Hydraulic cement.
been found in the Province, but it must be admitted that in con-
ience of the very moderate demand which has so far occurred for
n material, it has been but little sought after. Nodular calcareous
ks, containing a certain amount of clayey matter, such as occur in
Cretaceous and Tertiary series, sometimes in considerable abun-
ce, appear to be the most probable source of supply of cements, and
erve to be looked after and experimented with in this connexion.

t is highly probable also that some of the volcanic tuffs of Tertiary Trass.
, met with particularly in the region of the Interior Plateau, may be
nd of value for use in the manufacture of cements in a similar way
he *trass* of the vicinity of Andernach and elsewhere on the Rhine,
he Pozzuolana of Naples. These materials are merely ground and
ed, without being calcined, with a certain proportion of quick-lime,
are then found to possess excellent hydraulic properties.

Most of the tuffs actually known to occur in quantity in the Province,
situated at some distance from the line of railway, but it is possible

that some of the tufaceous rocks of the vicinity of Kamloops L might be employed in the manufacture of cement. On the coas have observed a considerable deposit of material almost identical appearance with the trass of the Rhine, at Lawn Hill, near the entra to Skidegate, Queen Charlotte Islands.* Other localities of simi material may also yet be found on the Coast, and should they pr to afford good hydraulic cement, they will possess great value for construction of wharves, etc., where wooden structures are rapi destroyed by the teredo.

Precious Stones.

Absence of gem stones.

Gems of the more valuable species, such as the diamond, sapphi etc., have not been as yet found in any part of British Columbia, a taking into consideration the great amount of placer gold-mini which has occurred, their apparent absence must be considered as rath remarkable; though this is perhaps due to want of observation on t part of the miners. Garnets are of frequent occurence, both imbedd in the crystalline rocks and found loose in sluice-boxes in the course gold-mining, but none have yet been observed sufficiently free fr flaws, or of size or colour such as to render them valuable for jewelle

Agates.

Agates and chalcedony are very often found in association with t volcanic rocks of the Tertiary, and on the shores of the northern pa of the Queen Charlotte Islands, as well as along some of the rivers a lakes of the interior, these may be collected in considerable numbers the form of rolled pebbles. Jasper also occurs in some places in the T tiary rocks, and the Indians occasionally employed this material a agate in the manufacture of arrow- and spear-heads. It is more co mon, however, to find arrow-heads in the interior of the Provinc composed of black cherty quartzite, which is there abundant in ma

Obsidian.

places. In the Northern Interior the Indians of the Tinné stock oft used obsidian or volcanic glass for the same purposes, the most notab locality for this material being the mountain named Beece or Anahim Peak, in the upper Blackwater country.†

Opal.

Siliceous deposits of the character of 'wood opal' are found whe siliceous springs have issued during the earlier stages of the Tertiar particularly in the vicinity of Vermilion Forks on the Similkame and near Dropping-water Creek, about two miles north-west from th head of Stump Lake. At the last-mentioned place, opaline silica a hyalite have been observed, filling cavities in a slightly cavernou trachyte, which occurs in great mass. Some specimens closely a

* Report of Progress, Geol. Surv. Can., 1878-79, p. 85 B.
† Report of Progress, Geol. Surv. Can., 1876-77, pp. 78-79.

ach precious opal in character, and the locality appears to be worthy urther examination, as the rock is identical in character with that lding the precious opal in Hungary and elsewhere.

pecimens of very beautiful blue sodalite, are found in abundance in Sodalite. vicinity of Ice River, a tributary of the Beaver-foot, in the Rocky untains. The mineral closely resembles lapis-lazuli in appearance, would possess considerable value as an ornamental stone for ellery, etc. Closer search than we were able to make would prob- y lead to the discovery of even larger pieces than those found by some of which, however, were several inches in diameter. The neral occurs in connexion with an intrusive mass of nepheline- nite.*

ade or nephrite was highly prized by the Indians of the coast of Jade. tish Columbia and Alaska for the manufacture of cutting imple- nts of the nature of adzes or 'celts.' It is frequently found in the m of such implements, varying in colour through various shades of en to brown, in the purer varieties quite translucent, but when less e becoming clouded and opaque. I have elsewhere shown reason the belief that this mineral occurs in place in the vicinity of the aser River, and have since found rolled pieces of it on the Lewes nch of the Yukon.† Some specimens constitute handsome orna- ntal stones.

Specimens of lignite from some beds of the Tertiary resemble jet in Jet. pearance, but are usually too brittle to be employed for purposes of nament. True jet may, however, be looked for in assocaition with se rocks.

Mineral resin in small drops and patches is of frequent occurrence in Amber. ne of the Tertiary and Cretaceous coals, and a small specimen of ie amber was found in the possession of the Indians in the Queen arlotte Islands and said to have been derived from the west coast of ese islands.

Annual Report Geol. Surv. Can., 1885, p. 124 B. Trans. Royal Soc. Can. vol. iv, Section p. 81.

Canadian Record of Science, vol. ii, No. 6, 1887. Annual Report Geol. Surv. Can., 1887, pp , 147 B.

Miscellaneous Minerals.

Minerals not discovered.

No single specimen of *tin* ore has yet been found in any part of Province nor have *nickel*, *cobalt*, *manganese* and *chromium* been discove in anything approaching workable quantity. *Graphite* or *plumbag* known, but not apparently in useful deposits. *Gypsum* deposits h not been found, and this mineral appears only in the form of selen

Ochres.

crystals in certain shales and clays. Red and yellow *ochres* occur several places, making, sometimes, a considerable shewing, but no tempt has been made to utilize them so far. *Baryte* or heavy-spar pears only as an accessory mineral, and no deposits of *rock-salt* or

Tripolite.

native sulphur have been discovered. *Tripolite* or diatomaceous ea appears forming certain layers in the Tertiary clays on the Blackwat and may probably elsewhere be found in like situations, and in the b of some of the very numerous lakes and ponds. *Kaolin* or china-cl

Asbestus.

has not been found. The occurrence of *asbestus* is noted elsewhere, apparently in small quantity only, though the abundance of serpenti leads to the belief that veins of chrysotile or serpentine-asbestus m

Mica.

be looked for with some probability of success It is also very pr able that valuable deposits of *mica* may be found in some of t granitic districts, and some localities of a promising character ha already been observed. *Fire-clays* may be expected to occur in t Cretaceous and Tertiary coal-bearing rocks, but so far as known th

Petroleum.

have not yet been sought for or tested. *Petroleum* is not kno in the Province, and though rumours were current some years since its occurrence in the northern extension of the Comox coal-field, th could not be substantiated. Tarry, bituminous matter is, howev found oozing out in several places on the Tar Islands of the Queen Ch lotte group.

Mineral and Thermal Springs.

Hot Springs.

Saline or mineral springs are known in a number of widely scatter localities within the limits of the Province. Several of these are not as hot springs, and it is probable that all the thermal waters conta

Salt Springs.

notable quantities of saline water. Springs characterized by a abundance of common salt are known at Nanaimo and Admiralty Salt Spring Island, but the flow of these is not so copious or t

Mineral Springs.

strength of the brine sufficient to warrant a belief in their econom importance. Of the other springs, some of which may possess ther peutic value, the only one so far utilized to any considerable extent that known as "St. Alice's Well," at the lower end of Harris Lake. A hotel has been built at this place and it is frequented

ıealth resort, accommodations for bathing, etc., being provided. ere are in the Selkirks and elsewhere a number of springs locally own as "Soda Springs," which are highly charged with carbonic d gas, and some of which are reported to be excellent as beverages. n the dry parts of the Interior Plateau region, many more or less saline ls and lakes occur, but the salts in these are usually those resulting rely from the local evaporation of ordinary surface waters. There also, in the same region, many small saline springs which issue m the superficial deposits or soft Tertiary rocks. These appear erally to contain sulphates of soda, magnesia, etc., and possess no nomic or therapeutic importance.

Such notes on individual springs as appear to be of importance are en in connexion with their enumeration on page 162 R.

NOTATED LIST OF LOCALITIES OF MINES AND OF KNOWN OCCURRENCES OF MINERALS OF ECONOMIC VALUE IN THE PROVINCE OF BRITISH COLUMBIA.*

Gold (placers).

Though many of the undermentioned placer-deposits are now abandoned, it has been endeavoured to make the list as complete as possible, for the purpose of indicating the localities of probable occurrence of auriferous veins.

Fraser River.

It is at this date difficult to correctly enumerate and place the principal auriferous 'bars' of the Fraser. The greater part of the work upon these occurred in 1858 and 1859, the first years of the gold excitement. Many bars were then named and worked for a short time only, and of others which were occupied for a longer time and yielded a large quantity of gold, it is not always possible to obtain any statistics or facts of a trustworthy character. The best authority for the names and positions of the more important bars, as far up as Lytton, is the Admiralty map of Vancouver Island and Adjacent Shores of British Columbia, No 1917, corrected to December, 1886. Much information is also contained in Vol. XXXII. of Mr. H. H. Bancroft's works, which the author has been at great pains to collect from innumerable sources of varying authenticity. From statements quoted in Mr. Bancroft's work, the greater part of the details of yield of various bars, given below, has been selected. The names of bars of which the position relatively to the others is not accurately known, are enclosed in parentheses.

The various bars are arranged as far as possible in order, following down the river.

Bars below Hope.—All these yielded very fine gold only.

Maria Bar.—Twenty-five miles below Hope, near mouth of Chilliwack River. This was the lowest bar on the Fraser which paid for work.

(Several bars of which the names are not known.)

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* Unless otherwise specified, the references throughout this list of localities are to the Reports of the Geological Survey, of which the dates are given, but not the full titles.

Hudson Bar.—A ditch a mile long here in 1859. Earnings, $8 to
a day.

Cornish Bar.—First known as *Murderer Bar*, four miles below H
In 1860, fifteen men were employed here, making from $3 to $4 a
This and other bars in the vicinity averaged as minimum earnings
to $10 in 1858.

BARS BETWEEN HOPE AND YALE.—Some of these bars yielded g
results in 1858 and 1859. In 1865 Chinamen were still making fi
$2 to $5 on them.

American Bar.—

(*Union Bar.*)—Two miles above Hope.

St. Clara Bar.—

Posey Bar.—

(*Cameron's Bar.*)—On this bar nineteen men are reported to h
made $75 a day each for three weeks. This was a mid-stream bar.

Emory's Bar.—Average earnings, $6 to $8.

Texas Bar.—Yielded as high as $15 to $40 a day to the hand.

Hill's Bar.—In 1858, the earnings are stated to have averaged
a day to the hand. Another authority places the earnings at fr
$2·50 to $25. Eight companies were making from $15 to $40. F
men on one occasion sluiced out gold to the value of $1000 in six da
Ten claims, each 26-foot frontage, produced $30,000 in less than f
months. (See p. 26 R)

Yale.—Bars here produced $15 to $20 a day per man. Sluic
yielded $25 to the hand. Mining still in progress in 1888.

BARS BETWEEN YALE AND LYTTON.—The bars between Yale a
Boston Bar are reported to have given an average yield of $12 a day
the hand, early in 1858.

Sailor Bar.—Five and a-half miles above Yale. In 1858 yielded
to four ounces a day to the hand.

Wellington Bar.—

Washington Bar.—

Spuzzum.—(According to Brancroft, there were between Yale a
Spuzzum, named, in addition to the above bars—Pike, Madison, Stea
boat, Humbug, Surprise and Kelly bars.)

Chapman's Bar.—

Dutchman's Bar.—

Cross Bar.—

Siwash Bar.—

Big Cañon.—

Nicaragua Bar.—In 1859, five men are stated to have taken out go
to the value of $118 in one day here.

ehama Bar.—
land Bar.—
oston Bar.—Mining begun in 1858. Bench mining in progress in
3.
ankee Bar.—
argo Bar.—
ariner's Bar.—
ancheria Bar.—
ew Brunswick Bar.—
ytton.—Mining begun in 1858. In January, 1859, 100 men at work
is vicinity averaging $8 a day.

ARS BETWEEN LYTTON AND FOUNTAIN.—In 1859, earnings on these
from $8 to $100. Averaged earnings stated at $9 to $10.
Mormon Bar.—In 1858 one rocker produced gold to the value of
0 in eight days. Another $800 in twelve days.
pindulum Flat.—Yielding gold to the value of $8 to $10 to the hand
May, 1859.
McGoffery Dry Diggings.—Rich benches. Nuggets valued at 50
ts to $12 found.
Foster Bar.—A party in July, 1858, obtained here, with rockers, in
hours, three to five ounces to the man. In May, 1865, miners
orted to make, with rockers, $3 to $8 to the hand. Sluice company
ducing at the rate of $8 a day to the hand.
Willow Bank.—Nuggets weighing four to six ounces found here.
Great Falls.—Reported at one time as yielding $10 to $30 a day to
hand in coarse gold. Nuggets weighing six ounces found.
Lillooet.—(Known as "Coyoosh" in 1858 and 1859.)
French Bar. (Just above Lillooet). In 1859 yielding $4 to$6 with
kers; $8 to $12 by sluicing.
Robinson's Bar.—In June, 1858, 100 miners making, at first, $80 to
a day each. Yield soon fell to $5 to $6.
Horse Beef Bar.—In 1859 yielding $2 to $6 a day to the hand.
Upper Mormon Bar.—Opposite Fountain. The diggings here and in
vicinity of Fountain were regarded as among the best. In 1858
rockers were averaging $47 each a day. There were also good,
diggings, thirty yards away from the river.

BARS BETWEEN FOUNTAIN AND ALEXANDRIA.—
Day Bar.—Two miles above Fountain. Earnings made of $8 to $12.
Haskell Bar.—Eighteen miles above Fountain. Earnings at rate of
to $12 with rockers; $16 to $20 by sluicing.
Big Bar.—Rockers yielded $5 to $6.
Island Bar.—Reported as giving good yield.

BARS ABOVE ALEXANDRIA.—In 1859 several of these became rat noted.

British Bar or *Cornish Bar.*—Thirty miles above Alexandria. In 1 a ditch five miles long had been made here.

Ferguson Bar or *Rich Bar.*—Three miles above last. Sixty dolla day to the man made here for some time.

Long Bar.—Seven miles above Quesnel has been worked almost c tinuously from early years. Earnings still about $3 a day.

Spanish Bar.—Thirteen miles above above Quesnel; some work s carried on.

Cottonwood Cañon.—On a high flat here some fairly coarse gold worked.

Tributaries of Fraser River and Places in its Vicinity not inclu under Subsequent Headings.

Yale Creek.—Near Yale. A little coarse and rough gold obtai here in late years.

Coquihalla River.—More or less coarse gold has been found alc nearly the whole course of this stream, particularly where it cuts area of the Anderson River slaty rocks, but it has never been extensiv worked. In 1864 diggings yielding $5 a day found on lower part, n Hope. Good prospects found on *Ladner's Creek* and on *Pierre River,* butaries, and in 1861-62 a good bar worked on the Coquihalla j below the mouth of the last-named creek.

Anderson River.—Some coarse gold found at one time ten miles abc mouth, but not enough to pay.

Main River Thompson.—Heavy gold found on this river up to *Nicoam* where, it is believed, the first placer gold in paying quantity in Brit Columbia was found. This region chiefly worked by the Indians the country, who, I am assured, have obtained many thousand doll in specially favourable years. River-bars worked here and there, as up as Kamloops Lake.

Lillooet River.—Flowing into Harrison Lake. Along this stream, 1859, gold to the value of $2 to $4 a day obtained with rocker; $5 $8 by sluicing. Similar earnings in 1867.

Portage between Seton and Anderson Lakes.—In 1880 Indians repor to be making small earnings here.

McGillivery Creek.—Enters Anderson Lake eighteen miles from he on west side. Coarse gold found in 1880. Value $18·50 per oun Gold to the amount of $1032 obtained in workings near mouth of cre in 1881, and further working abandoned.

Cayoosh Creek.—Diggings discovered in spring of 1886 by Chine

d worth $18 to $18·50 per ounce. In 1886 yielded 725 ounces. ld in 1888 estimated at about $52,000. Remunerative work has been ried on here uninterruptedly since the discovery. The gold obtained is the lower ten miles of the creek, below the outcrops of certain gold- ring quartz-veins, from which the placer gold is supposed to be ived. (See p. 71 R.) This creek affords a remarkable instance of n placer deposits which have remained long undiscovered in a ntry supposed to be well known. Mr. Phair, Mining Recorder, tes:—"It seems almost incredible that this creek, within an hour's lk of the town of Lillooet, should have been passed by for a quarter a century by hundreds, aye, thousands of the best practical white ners and prospectors of the Pacific Coast, and now at this late date prize falls into the hands of Chinese." (Report of Minister of nes of B. C., 1886, p. 207. See also same report for 1887 and 1888, . 273 and 312.)

Bridge River.—Discovered in 1858, and soon prospected nearly to its rces and some mining done throughout. Coarse gold for ten miles from mouth, further up generally scale gold. Some nuggets found lower part of river of from one to two ounces in weight, and one d to have been worth $300. This stream at first worked by whites, erwards chiefly by Chinese and Indians. In 1866 Chinese said to ve obtained gold to value of $66,000 to twelve men, by wing- mming. A good deal of the mining has been done of late years on e South Fork, which is reached by a journey of three or four days m Lillooet, *via* Seton Lake and across the mountains. Gold worth 6·50 per ounce, coarse, nuggets worth $10 to $22 having been found.

Gun Creek.—A tributary of Bridge River, fifty miles by trail from llooet. Placers discovered in 1859 yielding $6 to $15 a day.

Cadwallader Creek.—A tributary of Bridge River. Good prospects nd here in 1886.

Hat Creek.—Small quantities of gold have been found here.

Scotty's Creek.—A tributary of Bonaparte River. Prospects reported be good, but boulders in the valley render mining difficult.

Chilcotin River.—Gold in some quantity said to have been found near e mouth of this stream.

Nechacco River.—Colours obtained near Fort Fraser, and also abund- t near its junction with the Fraser River.

Chilacco River.—In certain banks near its mouth, eight or nine lours to the pan may be obtained. A small quantity of coarse gold und in a lateral creek by one of the men connected with the Canadian acific Railway survey in 1876.

Cariboo District.

WILLIAMS CREEK.—For description see page 34 R. Discovered 18(and has yielded more gold than any stream in British Columbia. examples of the yield in early years it may be stated that Steel claim gave a maximum yield of 409 ounces or $6524 a day. Ov $100,000 in all taken from this claim of eighty by twenty-five feet. 1862, Cunningham's claim produced gold to the value of nearly $20(a day for the season, while on several days as much as fifty-two poun weight of gold was taken out. The Adam's claim yielded to each its three partners $40,000, clear. These claims were above 'the cañon' shallow ground. The deep ground below 'the cañon' was first bottom near the end of 1861 by the Barker Co. (whence Barkerville). Tl Diller Company was the next successful in this, and it is credib stated that here, on one occasion, 200 pounds of gold worth $38,4(was obtained in one day. In 1863, three claims below 'the cañoi yielded $300,000, and twenty claims were steadily producing from ' to 400 ounces a day. Four hundred miners were at work on Willian Creek in this year,—'the Golden year.' The aggregate yield of Willian Creek, for the first seven years of working, for which no returns a available, was very large. In 1888 about twelve hydraulic clain were being worked.

The tributaries of Williams Creek, in order down stream, are as fo lows:—

Mink Gulch.—Joins from the west. Hydraulic work at outlet ha paid well.

Walker's Gulch.—Joins from the west at Richfield Court Hous(Deep work. Good prospects at different times and some quantity c gold taken out at its month, but has not held out. Hydraulic wor still in progress.

Grub, or *Black Jack Gulch.*—Joins from the west. A mere ravine c no great length, being all embraced in one claim. Has afforded goo pay by hydraulic method, but now worked out.

Stout's Gulch.—Joins from the west, below 'the cañon.' Very rich, bu now worked out for drifting. Hydraulic method employed.

Conklin Gulch.—Joins from the east, opposite Barkerville, discovere 1874, and has since proved very rich; the Ericson claim in that yea yielding 400 to 500 ounces a day. Ground very deep for so small valley, being ninety feet in lower part and twenty feet in highest drifting claim, one mile and a-half up; probably rich for hydrauli working.

McArthur's Creek.—Two miles below Barkerville and one mile abov Lane and Kurtz shaft-house; joins from the south-west. Paid well i

ting deep ground, but now worked out for this method. No hydrau-
work in progress.

eks entering Willow River.—

owhee Creek.—Discovered, 1861. Runs northward, nearly parallel Williams Creek, and empties into Jack-of-Clubs Lake, which also ives Jack-of-Clubs Creek, and is the source of the Willow River. d pay found in both shallow and deep diggings, and some good und still being worked. Gold, especially near source of creek, very rse and rough, often including fragments of quartz. Found difficult btain water for hydraulic work here, but otherwise promising. The don and Abbott claim in 1861, yielded from eighty to a hundred ces daily, and in 1884, the Sage-Miller claim yielded for a time n 300 to 400 ounces a day.

ack-of-Clubs Creek.—All deep work on this creek, gravel being 150 in depth near the mouth, where a few claims paid well. This creek favourite among those which are considered yet unproven, the im-ssion being that an old channel exists which has not been found.

Musquito Creek and *Red Gulch.*—Entering Willow River from the th below the last have been very rich. The ground was fifty feet deep nouth; now worked out for drifting. Hydraulic work has paid well.

Whip-saw Creek.—Three miles below Mosquito Creek, on the same e. In former years, from $10 to $12 per day per hand taken out, and re or less work carried on for many years by ground-sluicing and fting. No work now in progress but considered promising.

Several creeks below Whip-saw Creek on the south-west side of Wil-r River, have afforded no pay; fair prospects have been obtained in e creeks on the north-east side, but no rich paying ground found.

Hardscrable Creek.—Joins Willow River from the north. Drifting hydraulic work has been carried on, but without very important ult.

Slough Creek.—Joins Willow Creek from south and east, seven miles ow Jack-of-Clubs Lake. Chiefly bench and shallow diggings. Main ley never bottomed, but considered promising.

Burns' Creek.—Tributary of the last, from the north. Has yielded a od deal of gold from both deep and shallow diggings.

Devil's Cañon.—Joins Slough Creek from the south, half a mile below t. Bench mining still going on.

Coulter Creek.—Tributary of Slough Creek. Gold worked some years o.

Nelson Creek.—Joins Slough Creek from the south-west four miles low Jack-of-Clubs Lake. Hydraulic work.

New Creek.—Tributary of Slough Creek. A little work done here a w years ago.

Dragon Creek.—Tributary of Willow River. Two miles of the low part of this creek worked four years ago.

Rouchon Creek (sometimes called *Russian Creek*).—Joins Will River from south, thirteen miles below Jack-of-Clubs Lake. Sluici yielded $4 to $5 a day to the man. Mining still going on.

Barry or *Berry Creek.*—Joins Willow River from south-west fifte miles below lake. Shallow diggings.

Archer Creek.—A little work on shallow diggings some years ago.

Deadwood Creek.—Joins Willow River from the west five miles l low last. Shallow diggings.

Sugar Creek.—A branch of Valley Creek, which joins Willow Riv from the east a short distance above Deadwood Creek. Some go prospects, but never much pay. Some hydraulic work has be carried on.

Cañon Creek.—A stream running into Willow River far down i course, and reached by a trail twenty miles long from Beaver Pa House. Prospecting has been carried on here, but no rich place found.

Creeks lower down Willow River are known to hold some gold, b have not yielded it in paying quantity.

Lightning Creek.—Discovered in 1861, and in that year $200,0(worth of gold taken from Campbell's Discovery claim and the adjace Whitehall claim. Attempts were made almost from the first to rea the deep channel of this creek, but after much work, these were aba doned in 1864. Sinking was, however, resumed in 1870, and havi proved successful, led to the subsequent great developments. Th rich character of some of the ground on this creek may be illustrate by stating that at one time the Butcher claim yielded 350 ounces day, the Aurora, 300 to 600 ounces, and the Caledonia, 300 ounce For description see page 34 R.

The tributaries of Lightning Creek, in order, down stream, are a follows:—

Amador Creek.—No good pay yet found.

Van Winkle Creek.—Discovered, 1861. About 2000 feet of the lowe end of this valley paid well. In 1861 a company of four took out a average amount each of $600 worth of gold during the season.

Dead Man's Creek.—

Perkins' Creek.—Some gold obtained here of late years.

Chisholm Creek.—Good pay in shallow workings. Deep ground u proved, though great efforts have been made to test it.

Last Chance Creek.—Estimated that $250,000 worth of gold taken ou

this creek in a length of half a mile. Rich ground now probably rked out.

Davis Creek.—Good pay in shallow ground.

Anderson Creek.—Good pay in shallow ground.

Jaw-bone Creek.—No good pay found.

Peter's Creek.—Joins Lightning Creek from the south-east, a mile ow Beaver Pass. Reported to have afforded a considerable quantity gold. Not recently worked.

Basford Creek..—Tributary of the last. Work has been carried on re.

Campbell's Creek.—Also a tributary of Peter's Creek. Gold found and rked, but no particulars.

French Creek and *Canadian Creek.*—Joining Pleasant Valley from the ith, have both yielded some gold and were found locally rich, though ying ground run was through where the working was carried on. obably not exhausted.

Grouse Creek.—Six miles east of Barkerville, heading with Antler eek. Discovered 1860. Mined to some extent in 1861 and 1862, t with renewd vigour in 1864. The deep ground was very rich, and tended for about a mile near the upper part of the creek, giving out ther down. Deep ground worked out. Appearances favorable for draulic work.

Antler Creek.—Discovered 1859, but no work done till 1860. Heads Bald Mountain, opposite Williams Creek, and was one of the first eeks worked in this part of the country. Shallow ground for two iles, paid well, and has been worked out. The deep ground has not t been much tested, owing to the absence of clay, and consequent rge quantity of water met with in sinking. All the gulches join- g Antler Creek from the source down, have paid (*Wolf*, *California*, *tephens'*, and *Begg's Gulches.*) The creek has never been bottomed here these side valleys fall in. Chinese have been at work, and get y on benches 100 feet above the stream, a long way down. Antler reek yielded gold to the amount of $10,000 a day for some time in 361. It is stated that one company of three men obtained in three eeks washing, $83,300, and that in some spots the ground yielded 1000 to the square foot.

Nugget Gulch.—Tributary of Antler Creek. Good pay found at outh. Upper part not tested.

Victoria Creek.—Tributary of Antler Creek. Has been mined near ne mouth.

Branch of Eight-mile Creek.—(Five miles north of Barkerville.) A ittle mining work carried on here in early years.

Pleasant Valley.—A transverse depression, four miles in lengt uniting the valleys of Williams and Antler creeks, and joining t former about three miles below Barkerville. Has never been bottom or much prospected, but might be embraced in a scheme for drainir the valley of Williams Creek. (See p. 37 R.)

Bear River, and country about Bear Lake.—Gold has not been fou here in paying quanity.

Swamp River —Has attracted some attention, but no good pay h yet been found.

Cunningham Creek.—Discovered 1860, but not much worked till 186 In early days, a crevice containing 600 ounces of gold was found this creek, about twelve miles from its mouth. Several hydraul claims have been worked here. Since 1864, attempts to reach the dee ground have been made, but have not succeeded. It has always bee supposed that the deep ground in this creek would turn out rich, an if once proven to be so, a large amount of work would immediately b undertaken.

Harvey Creek.—The first gold in paying quantity in the Caribo district proper was found here in 1860, but comparatively little wor was done till 1864. One claim—the Minnehaha—has been exceedingl rich. Another at the junction of Swamp River, has paid well. Th Cummings Company bottomed it at one place, and drifted up in small cañon (unsuccessfully,) but found pay on entering wide groun The upper part of the creek is deep, and has not yet been thoroughl proven.

Creeks flowing into Cariboo Lake.—In *Nigger*, *Pine*, and *Goose Creek* small quantities of gold have been found. On the last-named, muc money was spent in putting in a flume, but with small result.

Keithly Creek.—Discovered in autumn of 1860. The main creek ha only moderately deep ground, (twenty to twenty-three feet,) of whic some is yet unworked ; it being expensive to open on account of th great quantity of water. Benches 100 feet above the stream have pai for open work, and some of them for drifting also, while a number o Chinese, who worked about the mouth, also got good pay. A littl hydraulic work has been attempted here with fair results.

Main Snow-shoe Creek.—Tributary of Keithly Creek. Has bee mined about one mile up, affording good pay. Ground deep. A tunne about three-quarters of a mile long is being driven to work the bed-rock

Little Snow-shoe Creek.—Tributary of Main Snow-shoe Creek. Thi is considered to be one of the most promising creeks of which the deep ground (though not extensive) has not been worked. Good pay

ained from shallow workings. Hydraulic work has been steadily ried on for some years and pays well.

French Snow-shoe Creek.—Tributary of Snow-shoe Creek. Worked at place, near the cañon, where the ground was shallow. Elsewhere, deep ground has not been tested.

Four-mile Creek.—Tributary of Keithly Creek. Hydraulic mines and fting near the mouth. Good pay.

Duck Creek.—Chinese have worked here. No recent mining of portance.

Spanish Creek.—Falls into North Fork of Quesnel River from the th (draining Spanish Lake) six miles below Cariboo Lake. Mining ried on at different times, but not recently. Prospects still consider- favourable.

Black Bear Creek.—North Fork of Quesnel. Much prospecting and ning have been done here and coarse gold found, but no rich pay. t yet considered faily tested, the ground being hard to work.

Kangaroo Creek.—Joins North Fork of Quesnel about two miles ove its junction with the South Fork. Paid well at one time.

Cedar Creek.—Discovered in 1862, but scarcely worked till 1866. One etty rich claim was worked here,—the Aurora—which yielded 0,000 in 1866. There were some other good claims in this year and the xt. Pay-dirt six to eight feet thick. The creek is now worked by hinese, who use the hydraulic method on a pretty large scale.

Coquette Creek.—Near the last. Discovered 1866, but soon given er to Chinese and worked by them for some years. Not worked in 86.

Hazeltine's Creek.—Some encouraging 'prospects' have been obtain- here.

Moorhead Creek.—Some work done here, but without good result. rospecting still going on. (1886)

Quesnel River.—Discovered 1859. Most of the work done on bars of ver, though many workings on benches one hundred to one hundred nd fifty feet above the water pay well. The gold is all fine. This gion is now altogether in the hands of Chinese who resort chiefly to ie Forks and South Branch. Several hundred Chinese work in this istrict during the summer, and winter at the Forks. The North ranch is said to have afforded profitable diggings as far up as Cariboo ake.

Swift River.—Rather inaccessible, and hard to work, being a rapid tream with many heavy boulders. Considerable quantities of gold ave been taken from it from time to time, and Chinese still at work.

Fountain Creek.—A tributary of Swift River, nine miles west of Mount Agnes. Chinese mining.

Cañon Creek.—A second stream of the same name, joins the Fras from the east above Quesnel. Diggings first reported in 1865. A co siderable quantity of gold obtained here formerly, some of it ver coarse and mixed with quartz.

Hixon Creek.—Discovered, 1866. A branch of the last. A nugge worth $700 was found here, and considerable placer-mining carried o for a length of two miles and a-half on the creek.

Terry Creek.—A tributary of Cañon Creek. Discovered, 1867. Sha low diggings yielded $6 to $8 a day.

Goat River.—Discovered, 1886. East of the lower part of Willo River and flowing into Upper Fraser River. A trail cut out to the creel in 1887, and some mining carried on.

Smoky River.—Discovered 1887. A tributary of Upper Fraser Rive from the north, some distance below last. Prospects of $3 to $ obtained with rocker, and considered encouraging.

Horse-fly River.—South of Quesnel Lake. Discovered and prospected in 1859 and 1860, in which years some paying work done on Horse-fly Creek, the branch connecting Horse-fly Lake with the main river. A party of five here took out at one time 101 ounces of gold in a week. Renewed excitement in 1867. More or less mining has since been carried out on this river and tributaries, particularly by Chinese. But no really important developments have occurred.

McLennan Creek.—Thirteen miles from Tête Jaune Câche, running into Cranberry Lake. Gold found in 1876, reported at $4 to $5 a day, but owing to heavy boulders in the stream and expense of supplies, has not been worked.

Similkameen, Rock Creek and Okanagan.

Main River Similkameen.—(Below Vermilion Forks.) Gold found in sharp unwashed particles at mouth in 1853, by Captain McLennan's party. In the cañon, near the 49th parallel, a considerable quantity of gold obtained in 1859-60; the largest piece worth $22·50. Few Whites remained on the river after the first few years, but much work was done by Chinese. In 1866, a little excitement occurred, and forty or fifty Chinese went in to work. After this the river was almost abandoned for some years, but about 1882, mining revived, and a few Chinese have been at work, scattered along the river from Vermilion Forks to the 49th parallel, ever since. Work confined to river-bars and low flats bordering the river. Gold all scaly or fine.

Creek, six miles above Boundary.—(South side of river.) Chinese have lately been working here.

shtinoulou River.—Joining Similkameen from the south. Scale gold d but Indians object to its being worked.

wash Creek, or *Five-mile Creek.*—Below Vermilion Forks on north Prospects obtained, but nothing to justify extensive work.

Wolf Creek.—Joins Similkamean about nine miles below Vermilion ks on south side. This heads with the source of a small stream ch joins the South Fork of Similkameen, about nine miles above milion Forks, a low valley running through. Miners think that valley represents an old channel of the river, and attempts have made to bottom it, but without success.

outh Fork Similkameen.—Gold discovered by government prospect- party under Mr. Allison in 1860, and Whites and Chinese have n working off and on ever since. $10 to $20 a day to the hand ob- ed occasionally in early years on bars. Gold fairly coarse for ty miles up from mouth and also found above this point, but not ked. Chinese have worked also in a little creek about sixteen es up on west side. (See Report 1877-88, p. 156, B.)*

Whip-saw Creek.—Tributary to South Similkameen, from the west. rked in a desultory manner since discovery of gold on the river, workings extending three or four miles up. Gold rather coarse. bed-rock here and in the neighboring part of the Similkameen sists of Tertiary strata. It seems not improbable that richer deposits y be found beneath these in the pre-Miocene valley which they fill.

Skagit River.—'Prospects' found in several places in early years, no mining north of 49th parallel. On *Ruby Creek*, a tributary ther south, gold discovered and working began in 1879.

Nine-mile Creek.—A tributary of the last, heading near Granite eek. Worked last summer for a mile or two from mouth. Gold her coarse. More or less platinum found in this and on the streams eviously mentioned.

Tulameen or *North Fork of Similkameen.*†—Some work done on this er as early as 1862, and though nearly all the white miners were wn away to Cariboo about that time, it is nearly certain that inese have been working off and on ever since. Working resumed whites as well as Chinese about nine years ago. River proved h from mouth up for about two miles, and paying work still in ogress at various places all the way up to two miles above gle Creek—twenty-three miles from mouth. Gold often coarse, d on lower two miles does not appear so much washed as further . On this part of river, three years ago, one company aver-

* See foot-note p. 115 R.

† Localities in this vicinity are referred to in greater detail, as no published description of m has yet appeared in the Reports of the Survey.

aged earnings of $8 to the hand. Four years ago, several min made as high as $20. All the work on the lower part of t river has been river-bar mining. Platinum is found everywhere alo the river with the gold, and native copper in scales and nuggets weig ing as much as an ounce is occasionally found. Above Slate Cre low benches and flats are mined by sluicing as well as the bed of t river by wing-damming, and Indians work here and there with rocke It is thought that the extensive benches in the angle between t Tulameen and South Similkameen would pay for hydraulic work, but is difficult to obtain water for this. Pellets of silver-glance, stru through with gold, have been found in sluice-boxes above Otter Riv

Granite Creek.—Joins Tulameen from the south, nine miles above mouth. Gold discovered in 1885 and caused considerable excitemer resulting in a great rush to the creek in the same year. Benches terraces 200 to 300 feet high occur at mouth of creek, but these ha been cut through as the drainage-level lowered, leaving a flat delta fan, on which the town is built. Just above this the valley becomes na row or V-shaped and runs back between bold mountains which rise abo 2000 feet above it. At the bottom of the valley is a cañon 200 to 3(feet deep which continues for nearly four miles. Above this the upp part of the creek and its branches are wider and with lower grad and have not been bottomed. Nearly all the gold has been obtain below the First Fork or in the first three miles and a-half in length the creek, in which the bed-rock was found at a depth of a few fee There is very little bench- or side-ground along this part of the cree though an old higher channel, with good pay, is occasionally foun running across points (as at the Gladstone claim). One or more ru of heavy gold are found in the 'fan' at the mouth of the creek, whic has yielded in places two ounces to a set of timbers, 10 x 5 feet. Th bed-rock has, however, not been reached below the mouth of the cañor The greater part of the rich ground on this creek has been worked ou being quite limited. The gold is coarse and rough, and the platinun which sometimes amounts to half by weight, has the same characte denoting a very local origin. About half a mile above the First Fork a patch of silicified Tertiary argillite occurs in the bottom of the valley shewing that the gorge is of pre-Miocene age, and the greater part of th erosion to which the concentration of the gold is due probably als dates from this early period. Forty Whites, and about the same numbe of Chinese on the creek in 1888. Several nuggets worth from $90 t $100 have been found. The yield of the creek is estimated at $90,00 in 1885 ;$170,000 in 1886, and $90,000 in 1887.

Collin's Gulch.—South side of Tulameen opposite Otter River. Heavy gold found and a little work done. A small ravine only.

Cedar Creek.—South side of Tulameen above the last. Gold rather eavy. A little work done. One claim gave $10 a day to the hand ıe first season. Coarse platinum found with the gold.

Slate Creek.—South side of Tulameen four miles above Otter River. old discovered 1885. Work in progress since 1886. Best result in 387, $7 a day to the hand. Small hydraulic claim working at mouth. old coarse and associated with coarse platinum.

Bear Creek.—North side of Tulameen one mile above last. Creek uns on bed-rock at mouth, and here a nugget worth $320 was found. bove the mouth ground deep and has not been bottomed. Much gold n the Tulameen below mouth of this creek, which appears to deserve rther work.

Hine's Creek.—A small gulch above the last, on the opposite side of ıe river. 'Prospect' of coarse gold.

Eagle Creek.—Joins Tulameen from north-west two miles and a-half bove Bear Creek. Coarse gold found but not much mining done.

Champion Creek.—Joins Tulameen from south-east, about six miles bove last. A large stream affording good prospects, but the ground as never been bottomed.

Boulder Creek.—Joins Otter River from the west, near its mouth. part from Granite Creek and the main river, most of the work in 388 done here. Worked for about a mile and a-half up from mouth.

Rock Creek.—East of Osoyoos Lake; a tributary of Kettle River. old discovered in 1859 or 1860. The narrow valley of the creek aid well for about a mile up, yielding generally one to two ounces a ay to the man. Some of the benches also paid, in one case, yielding alf an ounce a day to the hand for a season's work. In 1861, 300 iners were at work here, but it was nearly abandoned in the follow- ıg year. Working was renewed to a considerable extent in 1866. In 868, $8 to $10 a day to the hand was obtained by ground-sluicing, and bed-rock flume was constructed. In 1870 the Flume Company took ut $6000 at their first 'clean up.' At the mouth of the creek, a large uantity of gravel had been deposited where the valley widened, and this ras all thoroughly worked over, chiefly by Chinese, who have never uite abandoned these diggings. Desultory work among large boulders, vhich obstruct the channel, was carried on for many miles up the reek in early years, and lately a good deal of successful placer work has een done about ten miles up the creek. It is near the last-mentioned lace that the 'quartz' discoveries elsewhere mentioned (p. 68 R) have aken place.

Boundary Creek.—Joins Kettle River from the north-east. Developed

a little later than the last. Some very coarse gold found here, and good deal of desultory work done, but pay 'spotted.' Like the la the valley of this stream is narrow and cañon-like, and most of t mining was done near its mouth, and in places further up, where widened locally.

Kettle or *Nehoialpitkwa River.*—'Prospects' found and small quantiti of gold obtained on this river and several of its tributaries, nearly the head, but no mining of importance ever carried on. Country ve thickly wooded and difficult of access.

Okanagan River and Lake.—Scattered diggings found in 1859-60, b most of these soon abandoned; some because of want of water f working, and others probably left at the time of Cariboo excitemei In 1851, Mr. Cox, Gold Commissioner at Rock Creek, writes:—"V prospected nine streams, all tributaries of the lake, and found gold each, averaging from thirty to ninety cents a pan."

Mission Creek.—Joining Okanagan Lake from the east, is the on one of the streams above mentioned on which mining of importan has occurred. Mining began on this creek about 1875 or 1876 and h continued more or less actively since, attempts being made to u hydraulic machinery. Paid at one time at rate of two to three ounc to two to three dollars a day to the hand. Gold worth $18·50 ounce. The greater part of the gold was obtained at a place abo seven miles up the creek, where it issues from a narrow, rocky gor into a wider valley. The stream-bed gave the best returns, but bench and flats have also been worked. The modern gravels here rest soft Tertiary shales, and are more or less cemented by calcareo matter in their auriferous layers. It is quite possible that a seco channel remains to be found here beneath the edge of the Tertiai Gold coarse. (See Report 1877-78, p. 157 B, also p. 48 R of this repor

Cherry Creek.—Tributary of Shuswap River, thirty-five miles east head of Okanagan Lake. Gold mining has been prosecuted here wi varying success for thirteen years or more. The richest ground h been found in the lower three miles and a-half of the south branc Bed of creek here originally worked by wing-damming, and conside able work on benches and flats. In 1877 the best claim was payi about $10 a day to the hand. Nuggets worth $40, $90 and $130 ha been found, and the gold generally is coarse. Assay value $15·60 $16 per ounce, the alloy of silver being rather high. (See Repor 1877-78, p. 158 B. Also p. 68 R of this Report.)

East and West Kootanie. (*South of line of C. P. Railway.*)

Wild Horse Creek.—Discovered to be auriferous in 1863, and becan an important camp, with four hundred miners, early in the followi

ar. Ordinary claims were then paying from $20 to $30 a day to the
nd. In 1865, estimated that one thousand men were here and forty
fifty claims were working, producing one to three ounces to the
nd. Nuggets valued at $100 have frequently been obtained. The
rtion of the valley rich in gold is about two miles only in length.
ie bed-rock was found at no great depth below the present stream-bed
this part of the valley. The lower part of the old channel deepens
pidly and has never been reached. Profitable work has never ceased
this creek since its discovery, though the yield has fallen off after
e first years. The value of gold obtained from 1878 to 1887 (ten
ars) is returned at $231,380. The greater part of the gold is now
tained by the hydraulic method, five companies being at work in 1888.
eld in 1888, $24,400, though only a portion of the flumes and sluices
ere 'cleaned up' before winter. The gold is worth $18·25 an ounce.
Report 1885, p. 152 B.)

Bull River.—Ten miles southward from Wild Horse Creek, coarse
ld has been obtained from time to time in paying quantity near the
ñon, but can be worked only at low water.

Findlay Creek.—Thirty-two miles northward from Wild Horse Creek.
iggings discovered in 1865, and more or less mining from time to
ne. Much trouble from freshets, but prospects considered excellent.
1886, an English company obtained a grant of about four miles on
per part of the creek where gravel benches prospect well. A ditch
e miles long has been constructed, and hydraulic work begun. A
cond hydraulic company is at work further down on the creek.

Dutch Creek.—Lower end Upper Columbia Lake. Gold has been
rked here to a limited extent from time to time.

Toby Creek.—Lower end of Lower Columbia Lake. Diggings found in
64, and considerable excitement for a time. Renewed interest in
1885, when twenty men went to work on it, but in 1887, no work was
progress.

Cañon Creek.—Five miles south of Golden Station, C. P. Ry. Dis-
vered 1883. Some coarse gold obtained and a few miners reported
be making $8 a day in 1884. In 1887, no work. Work to be re-
med by a company in 1889.

Quartz Creek. Falling into Columbia River near Beaver Station, C.
. Ry. Gold discovered in 1884, but not at that time in paying quant-
y. About eighteen miles from Donald. Nineteen locations taken up
1888, and active work expected. Ground ten to fifteen feet deep.

Porcupine Creek.—A tributary of Quartz Creek. Eighteen miles
om Donald Station, C. P. Ry. Five claims worked in 1888, averaged
16 to the hand a day.

Perry Creek.—A branch of St. Mary River. Coarse gold found 1867. In the following years claims reported as generally yielding ounce a day. In 1869, a large number of miners on the creek. M ing carried on since with little interruption, but generally in a desult manner. Below the falls a "clay bed-rock" was met with, bene which was a deeper layer of auriferous gravel. This was reached some places, but the water generally prevented work. Reported t in 1869, gold to the value of $1500, was obtained in the deep gra from eight square feet of gronnd. The Perry Creek Gold Mining C are now at work here on a somewhat extensive scale, and with f prospect of success. They have a tunnel over 550 feet long at the pres time, running for bed of old creek, three miles above the site of old mining camp. Their shaft, five miles above the same place temporarily abandoned, owing to water.

Moyie River.—Placer camp located here in 1869. Mining has b carried on ever since with varied results, but never very extensive Diggings said to be 'spotted.' Earnings of $3 to $4 a day to man have been obtained. Gold worth over $18 per ounce, and of coarse. Only three Chinese at work in 1888.

Pend d'Oreille River.—Somewhat extensive work in early ye yielding from $3 to $4 a day.

Weaver Creek.—Flows into Moyie Lake. Very coarse gold fou High assay value. More or less work has been irregularly carried for many years. In 1888 about $5000 in coarse gold obtained.

Palmer's Bar Creek.—Empties into Moyie River about four mi above lake. More or less work for a number of years, but no striki developments. Coarse gold. Yielded $1023 to a company of four Chi men in 1888.

Boulder Creek.—Flows into Kootanie River about twenty-five mi from Bonner's Ferry. Coarse gold found.

Nigger Creek.—Situated between Weaver Creek and Palmer's B Some work for a number of years. Coarse gold but 'spott Abandoned in 1887.

Kootanie River.—Chinese have obtained fair wages near Toba Plains and below, but no regular work.

Gold Creek.—Flows into Kootanie River near Tobacco Plains, cl to the Boundary line. Fine gold, not found in paying quantity.

Deer Creek.—Flows into Upper Arrow Lake about the middle, fr the west. Prospect of heavy gold at time of Big Bend excitement

Fish River.—Enters north-east arm of Upper Arrow Lake. Kno to be auriferous.

Mosquito Creek.—A western tributary of the Columbia, betw Upper and Lower Arrow Lakes. Gold found.

Lardo River— Entering Kootanie Lake at north end, from the west. old found.

Slocan River.— Joining Kootanie River from the north below the ke. Gold found.

Howser Creek.—On this and another stream tributary to Duncan iver, which flows into the north end of upper Kootanie Lake, coarse old has been found. No work of importance.

Salmon Creek.—Flows into Pend d'Oreille River, near its mouth. ork here in 1865 and later, and some good results.

Forty-nine Creek.—Flows into Kootanie River below the lake. Work 1867 and later. In 1867, reported to yield coarse gold to the value $6 to $18 to the hand. This creek and the last, head toward the oad Mountain area, where quartz developments, elsewhere described, e in progress. Bed-rock not worked.

Cottonwood Creek.—Joins lower end of west arm of Kootanie Lake. rospects obtained.

Columbia River.— Wherever suitably circumstanced bars occur along is stream, to the north of the 49th parallel, fine gold is found in reater or less quantity. In 1865, several hundred Chinese were at ork within a short distance above Fort Shepherd. On bars five miles bove Revelstoke, $1·50 to $2·50 a day is obtained at low water.

Big Bend Country.

French Creek.—Tributary of Gold Creek nine miles from its mouth. ifty miles north of Revelstoke, C. P. Ry. Discovered 1865, and in at year yielded at least $32,000. In 1866 the Big Bend excitement ccurred, and this creek is reported to have produced gold to the value f $100,000. In this year or the next, four, six and even twelve unces to the hand a day was obtained on some claims, and one nugget orth $253 was found. French Creek was the richest in the Big Bend egion. Lower part of valley all deep ground which has never been ottomed. The creek was entirely abandoned for a number of years, but ork was resumed in 1886, attention being chiefly turned to the unex-lored deep ground, with promising indications. Creek and hill claims, owever, still being worked with some success. Mr. G. M. Sproat stimates that this creek and its tributaries affords about twenty-five iles of mining ground. A company at work in 1888 did very well oward the autumn, when they lost the pay streak. (See Reports of inister of Mines of B.C., 1886, 1887, 1888.)

McCulloch Creek.—A tributary of Gold Creek, four miles lower down han the last. Reported as a short creek, about four miles only in ength. History like that of French Creek, and as in the case of

that creek said to have yielded about $100,000 in 1866. Yielded $1(a day to the hand in some claims in early years, and nuggets ar rough gold with quartz attached found on it. Surface diggings wor ed out and deep ground found very difficult and full of boulder Work resumed in 1886, and has been continued to date, compani driving tunnels for deep ground with good prospects. A bed-roc flume company obtained a considerable amount of coarse gold in 18 on the lower part of the creek. (See Reports of Minister of Mines B.C., 1886, 1887, 1888.)

Downie Creek.—Flows into Columbia River from the east, thirt five mile above Revelstoke. A large stream, but appears never to hav been systematically prospected. Moderately good pay said to hav been found at one place eight or ten miles up it in 1867.

Carne's Creek.—East side of Columbia River, twenty miles north Revelstoke. Discovered 1865. This creek is six miles long to i forks, and each of the branches is supposed to be about the sam length. A cañon quarter of a mile from the mouth; wide grav banks below cañon; valley narrow above it. Mining on bars in earl years, the old valley not having been followed owing to water. Coars gold. For a time, below the cañon, earnings were $15 a day. Wor renewed in 1886 in several places, one company making $8 to $10 day to the man on the average. Bed-rock conjectured to be from fort to seventy feet deep. Work difficult on account of floods. Creek cor sidered promising mining ground, and the benches suited for hydrauli work. (See Reports of Minister of Mines, B.C., 1886 and 1887.)

Smith's Creek.—A large stream joining the Columbia from the wes opposite Gold Creek. In 1886 fifteen white miners here making $ to $11·20 a day to the man. The creek is twenty-five miles long an is considered promising. Fair 'wages' made here in 1888. A com pany putting in a long flume. (See Report of Minister of Mines o B.C. 1887.)

Fernie Creek.—Joins Columbia River eight miles above last. Coars gold. In early years, $8 a day to the hand made by four men for whole season. Mr. Sproat remarks that there are, including this an Smith's Creek, nine large creeks on the west side, and three on the eas side of the Columbia, between Gold Creek and the mouth of Cano River, in which pay gold was found in 1887, all worthy of being care fully prospected.

Frenchman's Creek.—The second stream up Canoe River on the east Gave good pay found for a season, some years ago.

North Fork Illecillewaet River.—Gold has been found here, but littl worked.

Kamloops Region and North and South Thompson Rivers.

Nicola River.—Scale gold found for about twenty miles up the Nicola, or as far as the mouth of Spioos Creek, also on Spioos Creek and its north-west branch, Prospect Creek. Only a little desultory mining done.

Nicola River, above Douglas Lake.—Some gold found in 1887, and worked to a limited extent by Whites and Indians.

Guichon Creek.—Prospect of fine gold reported in stream flowing in from the east below Mamit Lake.

Deadman River.—Joins Thompson River from the north below Kamloops Lake. A Chinese company worked on the east branch, in the cañon a short distance above the forks, for one season. Ground probably poor.

Tranquille River.—Enters Kamloops Lake from the north. Gold discovered 1858, and appears to have been worked with little interruption ever since, chiefly by Chinese. For many years twenty to thirty Chinese have been continuously employed here, but latterly the number has decreased and the earnings are now supposed to be small. The gravels worked are those of the banks and bed of the stream, and flats adjacent to it. Gold has been found for a distance of eight miles, in all, up the stream. It is mostly scaly and some platinum is associated with it. The rocks cut through by the stream are Tertiary volcanic materials, and the origin of the gold is obscure. (See Report of 1877-78, p. 155 B.)

Cherry Bluff Creek, Kamloops Lake.—Gold has been found here, and a little work was attempted at one time.

North Thompson River.—A few of the river-bars, not far above Kamloops, at one time paid to work.

Jamieson Creek.—Thirteen miles up North Thompson, west side. Some mining has been carried on here.

Louis Creek.—Twenty-nine miles up North Thompson, east side. Some mining said to have been done here as early as 1861, when $8 to $10 a day was reported to be made. Chinese and others have occasionally worked here since, chiefly in and just below the cañon, near the mouth of the creek. Higher tributaries to the south-eastward considered promising.

Barrière River.—Thirty-two miles up North Thompson, east side. Mining said to have been carried on here with good results in or about 1861.

Adams River and Lake.—Some mining was carried on here in early years, and gold reported lately on some small streams flowing into the lake, but nothing of importance developed.

Shuswap River.—More or less fine gold said to occur on bars along whole course. Some work done in early years.

Scotch Creek.—Flows into lower part of Great Shuswap Lake. Som mining done here at different times previous to 1877 but abandone for a number of years. Mining renewed in 1885 and in 1886, gold t the value of $22,000 produced. In the following year, the yield fell t $4000, and the creek is now again abandoned except by a few Chinese Mining was carried on as far up as the forks, eight miles from mouth of creek. Gold coarse, sells at $17 an ounce.

Omenica Region and Peace River.

Vital Creek.—Tributary of Omenica River. Gold found 1869. Firs work done one mile and a-quarter from mouth in ground from two t four feet deep. One-tenth of metal found 'silver' (arquerite) o which some nuggets were three ounces in weight. Some work still i progress in 1886.

Silver Creek.—Tributary of the last. 'Two-and-a-half-dollar' dig gings found in 1870.

Omenica River.—More or less gold on the bars.

Germansen Creek.—Discovered in 1870 and soon became the principa mining locality. Flows into Omenica River on south side, and head in lake near head-waters of Vital Creek. In 1870 good shallow dig gings for three miles, yielding half an ounce to three ounces of gold a day to the man. Total yield in this year $70,000. In 1871 much work going on. Three men, near the mouth, took out ten ounces a day t the man, but there were many blanks. Some hydraulic work o benches has been successfully carried on. 'Silver' (arquerite) also found in this creek. Some work still in progress in 1886.

Mansen Creek.—Flows into Mansen Lake. Gold discovered 1871. Yielded $20 a day to the man in some places, and nuggets worth $80 and $100 were found. Two companies sank shafts to deep channel, with good results in this year. Only two companies at work in 1875 and making little. Some work still going on in 1886.

Slate Creek.—A tributary of the last. Found rich in 1872, but fell off greatly in the following year. Miners stated to be making expenses in 1875.

Lost Creek.—A tributary of Mansen Creek. The "Irwin Company" of five men took out 192 ounces in a week in 1871. Another company sank fifty to seventy feet to the deep channel and got large pay. Most of the deep channel never bottomed. Little work in 1875. Some work going on in 1885.

Skeleton Creek.—A tributary of Mansen Creek.

Elmore Gulch.—Some gold obtained. Mining profitable in 1874.

Black Jack Gulch.—A tributary of Mansen Creek. Five men in 1871 made $200 a day continuously here.

Mansen River.—(Below the lake). Diggings reported in 1871 but ppear to have been soon abandoned.

Kildare Gulch.—Yielded a little gold in 1881 and 1882.

May Creek.—(Osalinka of maps). A tributary of Omenica River. ielded a little gold in 1882.

Finlay River.—This large river is well thought of by all the miners ho have seen it, but has not been thoroughly prospected, and none of s tributaries above Omenica River have been examined. Fine gold n all the bars, and in 1861, on a bar three miles up from its mouth, ree and four ounces a day to the hand obtained.

Nation River.—A tributary of the Parsnip from the west. Streams ear head-waters known to be auriferous but very little prospected.

Parsnip River.—The lower portion of this river proved highly remu- erative for a limited time. Bar mining and fine gold. Its eastern ibutaries appear to be well worth prospecting.

Iroquois Creek.—Between Forts St. James and McLeod. Gold eported. (Report, 1875-76, p. 257.)

Peace River.—Formed by the confluence of the Parsnip and Finlay. o the east of the Rocky Mountains, gold was found by a couple of rospectors from Quesnel in 1861. Scale and flour gold along the whole ourse. Many of the bars at first yielded $10 to $15 a day to the hand.

Cassiar District.

(Facts relating to gold mining in Cassiar district are given in some- hat greater detail, and in connexion with its geological features, in nnual Report, 1887, Part B.)

Stikine River.—Gold discovered 1861. Very fine gold all along river, ut little profitable work below Clearwater. The good ground xtended thence to Grand Cañon, above Telegraph Creek. Coarse gold as found in a few places above Telegraph Creek, in the cañon. Bars n Stikine at first averaged $3 to $10 a day to the man, and as much as wo to three ounces sometimes obtained. Work has now practically eased, possible earnings being reduced to $1 to $3. The circumstan- es appear to indicate the existence of an old channel above the pre- ent river-bed and beneath the basalts, in the cañon. Below Telegraph reek, extensive benches at various levels which should pay for hydrau- ic work. (See p. 47 R.)

Tahl-tan, or *First North Fork of Stikine.* Heavy gold found and orked for a number of miles up this stream. Pellets of 'silver' arquerite) also found.

Tooya, or *Second North Fork of Stikine.*—'Prospects' obtained, but no erious work known to have occurred.

Dease Creek.—Joins Dease Lake from the west. Discovered 187 Formerly yielded from $8 to $50 a day to the hand, from the mouth f about six miles up. Further up, some isolated good claims worke The bed of the creek is nearly worked out, the ground having bee shallow. A few bench claims still yielding fairly. Hydraulic wo on a small scale. Gold coarse and generally well rounded; wor $15 50 to $16 per ounce.

Thibert Creek.—Joins Dease Lake from the west, near lower en Discovered 1873. Good ground for about six miles up from mout Yield at about same rate as last. Creek bed worked out, but bench and side-ground being worked by hydraulic method and driftin Gold coarse, worth $16 an ounce.

Mosquito Creek.—A tributary of the last. Very good 'prospects' ha been obtained here; as much as $40 to a six-foot set of timbers.

Defot Creek.—A tributary of Cañon Creek, which is on the same (wes side of the Dease, with the last. Gold coarse, rough and often full quartz. Large nuggets, including one of fourteen ounces. Has bee for a limited area, (about a mile in length) one of the richest pieces ground in the district. The gold is evidently derived from massive d posits of quartz, which occur at the head of the creek, at a conside able elevation.

Beady Creek.—Dease River, east side. A little bar-mining in 187 and 1875, but nothing of importance developed.

Eagle River.—Dease River, east side. Good prospects, but no minin carried on.

McDame Creek.—Enters Dease River from the north. Discovere 1874. Highest earnings from $6 to $100 a day, when mining at its bes Gold coarse, worth $17·75 to $18 an ounce. Comparatively little wor done in the stream-bed, the best ground being an old high-level cha nel, worked in places for fifteen miles up. Bench claims run for abou seven miles up. Valley wide, with numerous tributaries, most which yield gold. Gold has also been found on heads of streams flow ing to the north, beyond the McDame water-shed.

Snow Creek.—A tributary of the last. Discovered 1875. The riches single claim in Cassiar was near the mouth of this creek, and paid fo a week 300 ounces for six or eight men. Seventy-two ounces washe from one pan of dirt in 1876. Now nearly worked out. Gold wort $18 an ounce. Decomposed rusty quartz containing gold, found o this creek.

Quartz Creek.—A branch of Trout Creek, tributary of McDam Creek. Discovered 1875. Highest average $5 to $20 a day. Gol coarse and rough, with quartz attached. Nearly worked out.

Rosella Creek.—Tributary of McDame Creek. Discovered 1876

ighest average per day $5 to $15. Gold worth $18·25 an ounce. bandoned.

Patterson Creek.—Discovered 1877. Highest average per day $5 to 20, generally paid 'wages' at $6. Gold worth $18 an ounce. bandoned.

Dennis Creek.—Discovered 1877. Returns about same with last. old worth $18·25 an ounce. Abandoned.

Gold Creek.—Discovered 1877. Best earnings per day $5 to $50. old worth $18 an ounce. Bench and creek diggings. Abandoned.

Slate Creek.—Discovered 1877. Highest average earnings $10 a day. old worth $18 an ounce. Bar diggings. Abandoned.

Somer's Creek, or *First North Fork of McDame.* Discovered 1876. arnings of $10 to $100 a day made. Gold worth $18 an ounce. bandoned.

Third North Fork of McDame.—Discovered 1877. Creek and hill iggings. Abandoned.

Spring Creek.—Discovered 1877. Earnings of $10 to $20 a day were ıade. Gold worth $18·25 an ounce. Principally hill diggings. Abanoned.

Fall Creek.—Discovered 1877. Some gold obtained. Abandoned.

Rapid River.—Dease River, below McDame Creek. Prospects obıined, but no mining of importance.

French Creek.—Dease River, north side, below McDame Creek. Some old obtained.

Walker Creek.—Discovered 1876. Said to be distant about seventyve miles in an easterly direction from mouth of McDame Creek. robably a tributary of Black River. Some gold obtained, but results ave never been satisfactory.

Black, Turnagain or *Muddy River.*—Reached by same trail as last, nd said to be about ninety miles distant from McDame. Fine gold btained on bars, and supposed that coarse gold may occur near headaters, but has not yet been discovered.

Lower Liard River.—(Below confluence of Dease).—Here Messrs. hibert and McCullough first discovered gold, and for some years a ood deal of work was carried on upon river-bars, the gold being fine. he best known bars, in order down the river, were—*Porcupine Bar*, bout fifty miles below the mouth of the Dease, north side of river; *Red-rock Bar*, about five miles below last, on south side of river; *McCulloch's Bar*, near site of Old Fort Halkett.

Upper Liard River.—(Above confluence with Dease). 'Prospects' nd more or less river-bar mining in a number of places. In graveleds resting on old rocks at the Lower Cañon, 'wages' at $4 a day an be obtained with rocker.

The following creeks in Cassiar District, which are reported as ha ing yielded some gold, I am unable to place:—*Mitchell's Creek, Brown Gulch, Poorman's Gulch* or *Creek, Fred Hart Creek.*

Yukon District.

This district is beyond the northern boundary of the province British Columbia, which is constituted by the 60th parallel. A summar of the few facts relating to its placer deposits is, however, include here. The two localities first referred to below, are naturally attache to the Cassiar district, and have been prospected from that district.

Sayyea Creek.—Joins Upper Liard from the west, about fifty-fiv miles above the Frances. Good prospects were obtained here in 187 of coarse gold. Little work has been done, but reported that the pa ing ground gave out.

Finlayson River.—Joins Frances Lake from the west. Prospectin done at mouth, ten or twelve years ago, gave earnings at $8 to $10 day. Many streams in this region have a very favourable aspect, an have never been prospected. (Report 1887, p. 113 B.)

Lewes River.—Gold discovered, 1880. Mining began, 1881. Remu nerative river-bars occur all along this river below the mouth of th Tes-lin-too or Newberry, but the richest so far worked are within a di tance of seventy miles below this point. Many bars yield $10 a day t the hand. Cassiar Bar, which has proved the best, is said to hav yielded $30 a day to the hand in some cases, but is now worked ou Gold all fine. The whole length of this and other rivers will, doubtless eventually be worked when the county becomes more accessible. (Re port 1887, p. 180 B.)

Tes-lin-too River.—A tributary of the last. Bars similar to those the Lewes as far up as Tes-lin Lake. (See Report 1887, p. 156 B.)

Nī-Sutlīn-hī-nī.—The main feeder of Tes-lin Lake. Similar rive bars. A little work has been done on them. (Report, 1887, p. 156 B.)

Big Salmon River.—A tributary of the Lewes. River-bars, with mor or less fine gold, along whole course, but no good paying bars ye worked. (Report, 1887, p. 152 B).

Upper Pelly River.—Remunerative river-bars discovered in 1882, an some of these, between the mouth of the Lewes and the Macmillan, hav been worked. More or less gold on bars as far up as they have bee prospected. (Report, 1887, p. 134 B.)

Ross River.—A tributary of the last. This stream is believed to b the one on which several miners made at the rate of $18 a day som years ago. (Report, 1887, p. 134 B.)

Stewart River.—Tributary of Pelly or Yukon, from the east. Gol discovered, 1885, and in this year and 1886 as much as $100 a day t

ıe hand made on river-bars. Probably $100,000 worth of gold already btained. Gold all fine, but reported to become somewhat coarser far p the stream. Very little black sand found with the gold, but garet sand common. More or less platinum associated with the gold ere and on all the streams in the Yukon basin.

Sixty-mile Creek.—Between Forty-mile Creek and Stewart River, est side of Pelly or Yukon River. Pieces of quartz containing gold ound in drift. Prospects of alluvial gold found, but no placer work arried on.

Forty-mile Creek.—Tributary of Pelly or Yukon, from the west. Discovered, autumn of 1886. Coarse gold and nuggets found here, the nly place, so far, in the Yukon district. Earnings as high as $100 a ay to the man occasionally. A number of miners making $14 a day in 887, but in 1888 earnings small, owing to continued high water. The tream is said by the miners to be a 'bed-rock creek,' *i. e.* one without leep drifting or sinking ground.

Region of the Coast Ranges and Skeena River.

Seymour Creek.—Burrard Inlet. Some gold got here at one time, ut work abandoned.

Prospect Creek.—East Branch Homathco River, above Tatlayoco Lake. Some fine gold found here by men connected with C. P. Ry. urvey in 1875.

Homathco River.—Prospects obtained, but no mining done so far as known.

Lorne Creek.—Skeena River; discovered 1883. Valley reported deep and narrow. Gold obtained principally in bed of creek, though sideground and benches favorably spoken of. Much trouble has been experienced from floods. Yield reported in 1884, $17,000; 1885, $18,000; 1886, $12,000; 1887, $3,795.

Bone's Gulch.—Skeena River. Producing a little gold in 1886 and 1887.

Douglas Creek.—Kitsumgalum, Skeena River. Prospecting in 1886 and a little gold got, but work abandoned.

Other streams flowing from Cascade Range.—Prospects have been obtained in a number of these, but details are wanting and no important placer-mining has been developed.

Vancouver Island.

Leech River.—This stream has proved auriferous for four or five miles of its length, where it flows along the strike of a belt of slaty argillites. It was discovered in 1864, and within a few years thereafter

yielded gold to the value of $100,000 to $200,000, according to variou estimates. Gold often coarse and nuggety, and earnings as high a $34 a day to the rocker were reported in 1864. The ric ground found in the present river-bed is supposed to be exhauste though desultory mining has been carried on ever since at interval A good deal of 'crevicing' has been done on bed-rock. Benche rather extensive and all contain more or less fine gold. The "Gordo Hydraulic Mining Company (Limited)" have lately acquired a extensive tract about half-way between Sooke River and the Nort Fork of Leech River, and are putting in hydraulic machinery. Fo details on Leech River see Report, 1876-77, p. 95.

Sooke River.—(Below its junction with Leech River).—Fine gol only found here and probably derived from Leech River.

Goldstream Brook.—Runs on strike of Leech River slates, furthe east. 'Colours,' but no pay, found here.

Jordon River.—Discovered and worked about the same time wit Leech River. Coarse gold obtained, largely by 'crevicing.' It ha been estimated that $30,000 worth of gold was taken out within a few months after discovery.

Nanaimo River.—Attracted some notice in 1877, but has never proved rich. A few Whites and Chinese work here almost every year, making small wages. They follow the river up to its head, which is not fa from that of China Creek, Alberni Canal.

San Juan River.—Entering San Juan Bay at about twenty mile above salt-water. Some coarse gold obtained by 'crevicing' on a short length of this stream. Formation reported to be slate.

Cowichan River.—Mr. Brown, of the Vancouver Island Exploring Expedition, (1864) reports gold on all the bars of Cowichan River in quantities of one quarter of a cent to three cents to the pan.

Foley's Creek.—(Cowichan Lake ?) Mr. Brown reports: "'Prospects' to $2 per day and one which ought, to an experienced miner, to pay from $5 to $8 per diem."

China or *Atlat Creek.*—Situated about seven miles down Alberni Canal from its head, on south side; not named on chart. Discovered about 1871 and worked steadily for three years, chiefly by Chinese. A little work still going on. Paid for a distance estimated at twenty miles up from mouth and gold found to sources. Earnings of Chinese supposed to have been about $5 a day. Some prospecting for 'quartz,' with hopeful results, has been done in mountains about this creek.

Awatsish Creek.—At 'First Narrows,' lower down inlet than last, but rising in the same mountains with it. Some coarse gold has been found, but ground very bouldery, and no serious work has been attempted.

Bear River.—Head of Clayoquot Sound. An excitement about this ce got up in 1862 and 1863, and again in 1887, when twenty to rty Whites and many Chinese visited it. Fine gold found but not in ving quantity. Mr. Buttle, of Vancouver Island Exploring Expe- lion, reported occurrence of coarse gold on one of the sources of this er.

Gold River.—Nootka Sound. Prospected on several occasions. Fine d found, but not in paying quantity.

Cape Commerell.—North end of Vancouver Island. Beaches with ck sand containing gold. Little has yet been done to ascertain ether the gold is in remunerative quantity.

Cape Cook.—Two smaller streams on outer end of this cape, and one south side, give 'prospects,' but bars quite limited and never rked.

Ou-ou-kinsh Inlet.—A small stream here known to yield a fair rospect.'

Streams tributary to Puntledge Lake and a little stream just east of pe Commerell are also known to contain gold in small quantity.

For some of the above notes relating to Vancouver Island, I am lebted to Mr. J. Jacques.

Queen Charlotte Islands.

No paying gold-placers have ever been found in these islands, though ld is present in fine scales in deposits of magnetic iron sand, which e met with about Cape Fife, and possibly elsewhere. (Report 1878- , p. 33 B.)

GOLD (AURIFEROUS VEINS).

The principal known occurrences of gold-bearing veins, as distinguished m placer deposits, are enumerated in the table of assays of the precious tals, pp. 76 R *to* 79 R. *In Mr. Bowman's report on the Mining Disirict Cariboo about* 100 *localities of quartz-veins in that district, known or puted to be auriferous are catalogued and described, and these it is not nsidered necessary here to repeat. A few localities only which are not cluded in the table of assays, or in Mr. Bowman's report, are mentioned the subjoined short supplementary list.*

Mitchell or *Gold Harbour, Queen Charlotte Islands.*—Rich gold-bearing ein, referred to on p. 17 R, exact position marked on Admiralty hart No. 2168, and in Geological Map of Queen Charlotte Islands, ublished in Report for 1878-79. Mr. Woodcock, who again prospected his place in 1878, informed me that the original vein was probably

not over three feet thick, and appeared to be worked completely o in an excavation thirty feet long by twelve feet deep. The vein w quite vertical. Green crystalline country-rock, probably diabase. M Woodcock found some small quartz seams about a mile and a-half fro the original locality which contained visible gold.

Sebastopol Creek.—About sixty miles up the Skeena River a above Kitsalas. "Sebastopol ledge," situated about two miles up t stream. Assay by Mr. Tiernan, of Victoria, reported as giving—go $42·18, silver, 13·47 to the ton.

Clinton.—Loose specimens of hæmatite and quartz containing visib gold, found here in 1886, but not traced to their origin. Reported yield gold to the value of $300 to the ton on assay. (Report Minister of Mines of B. C., 1886, p. 207.)

Near Cottonwood Creek.—(Near Toad Mountain, West Kootanie A number of claims located on free-milling gold-ores; reported to rich, and high assays are quoted by Mr. Sproat. (Report of Minister Mines of B. C., 1888, p. 299).

Near Lardo River.—(West Kootanie.) Free-milling gold-quart reported to contain $4 to the ton, has been found. (Report of Minist of Mines of B. C., 1888, p. 304).

Findlay Creek.—(East Kootanie.) Free-milling gold-quartz reporte (Report of Minister of Mines of B. C., 1888, p. 307).

Big Bend Region.—In addition to the places mentioned in the tab of assays, it may be stated that rich specimens of gold-bearing quar derived from the "Homestead" and "Big Bend" claims, have be received.

Vicinity of Rock Creek.—Free milling gold-ores reported here, addition to silver-ores. Rich hand specimens received. Referred p. 68 R.

Monashee Mine.—Between Cherry Creek and Kettle River. Fr gold reported. Referred to p. 68 R.

The following claims covering veins known or reported to contai gold, generally in association with some silver, are in the vicinity of th Lower Fraser, "Teague's" Harrison Lake; "Seymour Creek," "Lottie, "No Surrender" and "Vancouver," at various places on or nea Burrard Inlet. I am unable to furnish any authentic particular respecting these.

Texada Island.—Gold-ores recently discovered here, and many claim recorded. No particulars yet available. See p. 74 R.

SILVER.

The principal known localities of silver-ores have already been enumerated, ther on pp. 56 R *to* 74 R, *or in the Table of Assays, pp.* 76 R *to* 79 R. *e also some references under Copper, p.* 101 R. *It would serve no useful rpose to endeavour to name the many hundred individual claims which ve lately been recorded on silver-ores, even if it were possible to do so. his supplementary list contains known occurrences of silver amalgam (ar-erite) or native silver, so far found only in connexion with gold-washings.*

Vital Creek, Omenica District.—Considerable quantities of arquerite, ten in nuggets, found here in the placer-mines. A specimen sub-cted to analysis contained 83·30 per cent. of silver. See p 73 R.

Similkameen River.—(Near Vermilion Forks.) Small quantities of tive silver or arquerite found in gold-washings, occasionally weigh-g two to three pennyweights. (Report 1877-78, p. 162 B.)

Mission Creek, Okanagan Luke.—Pellets of native silver or arquerite und occasionally with the gold. (Report 1877-78, p. 162 B.)

Similkameen River, near the Boundary-line.—Small pieces of native ver or arquerite occasionally found in gold-washings.

Nicoamen, Thompson River.—Native silver occasionally found in gold shings. Small pieces of this material have been obtained and ove to be silver and not arquerite. In 1858 and 1859 pieces of con-derable size are reported to have been discovered.

Tahl-tan River, Cassiar District.—Arquerite found in gold-washings. eport 1887, p. 80 B.)

COAL AND LIGNITE.

In the following list of localities of coal and lignite, no attempt is made t enumerate the very numerous occurrences and outcrops in the well known l-fields of Nanaimo and Comox, nor even to mention individually the ious workings upon these, which have already been described, and for rmation upon which the foregoing pages, as well as the various Reports he Survey, must be consulted. In the less known regions, I have endeavoured nention all the scattered discoveries which have come under my notice.

Queen Charlotte Islands.

owgitz, Skidegate Inlet.—Anthracite coal referred to on page 85 R. e also Report, 1878-79, p. 71, B, 1872-73, p. 56.)

South Side of Skidegate Inlet.—Anthracite coal, much disturbed small -crop. (Report 1878-79, p. 68 B.)

Ya-koun River.—Bituminous coal of good quality and reported to be feet thick, referred to on p 86 R. (See also Report 1887, p. 17 T.)

Chin-oo-kun-dl Brook.—Lignite. Impure and thin seams. (Repo 1878-79, p. 85 B.)

Ya-kan Point.—Lignite. Irregular deposits on the beach. (Repo 1878-79, p. 86 B.)

Skon-un Point.—Lignite. Beds of some thickness on the beac (Report 1878-79, p. 86 B.)

Ma-min River, Masset Inlet.—Lignite in thin seams six miles up th river. (Report 1878-79, p. 88 B.)

Naden Harbour.— Stream on east side. Drift lignite in the broc (Report 1878-79, p. 89 B.)

Vancouver Island.

Nanaimo District.—Bituminous coal which has been worked f many years. Described on p. 90 R. (See also Reports 1876-77, p. 1 1871-72, p. 81, 1873-74 p. 96, 1874-75 p. 82.)

Comox District.—Bituminous coal, now being opened up on an e tensive scale. Described on p. 89 R. (See also Reports 1876-77 p. 1(1871-72 p. 76, 1872-73 p. 32, 1873-74 p. 95.)

Campbell River.—This stream flows into Discovery Passage. B uminous coal reported on it about twelve miles inland. (Report 18 p. 19 B.)

Kuhushan Point.—Coal reported in stream which reaches the coa half a mile south of this point. (Report 1886, p. 18 B.) This locali and the last are included in the northern continuation of the Com coal-field.

Forward Inlet area, Quatsino Sound.—Bituminous coal. Thin sea only found as yet, noted on p. 86 R. (See also Report 1886, p. 83 B.)

Koprino area, Quatsino Sound,—Requires exploration by boring. coal outcrops known. Referred to on p. 87 R. (See also Report 18 p. 86 B.)

Koskeemo area, Quatsino Sound.—Bituminous coals, noted on p. 86 (See also Report 1886, p. 89 B.)

Suquash.—Coal. Noted on previous pages (p. 80 R, 88 R.) (See a Report 1886, p. 62 B., *et seq.*)

Kliksiwi River.—Coal seam near here of sixteen inches in thickne (Report 1886, p. 62 B, *et seq.*)

Ki-uk River and vicinity.—Bituminous coal in thin seams. (Rep 1886, p. 62 B. *et seq.*) This locality, and that preceding it are cluded in the Suquash coal-field.

Saanich Inlet.—Thin coal-seams found in several places in this vic ity, but none, so far, of value. Included by Mr. Richardson in Cowich area. (Report 1876-77, p. 187.)

Sooke.—At the entrance of the harbour,and elsewhere in that vicinity, umps of coal or lignite found upon beaches. Probably derived from 'ertiary rocks of which an area there occurs. A boring was at one ime made to a depth of 139 feet, but did not pass through any coal. Report 1874-75, p. 83, 1876-77, p. 190.)

Head of Alberni Canal.—Coal is reported here and rocks of the Cre- ıceous coal-bearing series occur, but have not been fully examined.

Clayoquot Sound and *Ucluelet.*—Bituminous coal found in several laces in this vicinity, but no geological examinations yet made.

Cowichen Bay.—Small fragments of anthracitic coal have been)und in sandstone here by Mr. Richardson.

Koquesila River.—Specimens of impure anthracite obtained some istance up this stream. A little prospecting work has been done here.

Mainland of British Columbia.

Sandstone River.—North-east side Malaspina Strait. Coal or lignite, ı thin irregular layers. There is a considerable area of sandstones etc. ere, probably of Cretaceous age, but a small thickness only is exposed ı the river. (Report 1886, p. 31 B.)

Vicinity of Vancouver.—Burrard Inlet. Two series of lignites or gnite-coals come to the surface here. The upper series is seen near ıe Brewery, Brewery Creek, half a mile south of False Creek and else- where, both east and west of that point. The lower series is seen near)stranders Point, Stanley Park, and again on the line of strike, to the ıstward, within half a mile to a mile west of Hastings. All the seams) far found are quite thin, seldom exceeding a few inches.

Kanaka Creek.—Near Haney Station, C. P. Ry. At about four miles)ove the mouth of this stream, seams a few inches thick, of coal or gnite-coal occur.

Warnock Creek.—Near Warnock Station, C. P. Ry. Two-thirds of a ile up from mouth of creek, small seams of coal or lignite.

Stave River.—Half a mile above mouth of river, a small seam of coal : lignite.

Mission Hills.—About five miles up Stave River. Some fragments f coal or lignite reported, but have not been traced to source.

Slalets Mountain.—Near Sumass Mountain. At this place, about ve miles south of Frank Wade's store and landing, a seam over twenty ches in thickness of excellent coal has been found.

Chilliwack River.—Irregular 'bunches' of good bituminous coal und in sandstones about three miles and a-half south-west of Chilli- ack village (Centreville) near the road from that place to Capt.)hn's village, and about half a mile north-east of the road-crossing of

the river. Many other occurrences of similar coal are known in t Cultus Lake range of hills, which skirts the Sumass valley. (S analysis No. 19, p. 98 R).

(The above notes on places near the Lower Fraser are suppled by M A. Bowman, and are given at greater length, as they are not elsewhe available in published form.)

Junction of Nicola and Coldwater Rivers.— Coal, noted on page 96 (Report 1877–78, p. 125 B.)

Coldwater River. — Coal, of same formation with last, in sever places. (Report 1877–78, p. 126 B.)

Quilchena. — On McDonald's River, which enters Nicola Lake this place, at about three miles and a-half from the lake. Lignite poor quality. Thickest seam exposed about two feet.

Guichon Creek.—Joining Nicola River from the north. Lignite good quality found three to four miles up this stream, but bed not ful exposed.

South Fork of Similkameen River.— (Above the mouth of the Pasa ten) Lignite reported in micaceous sandstone. (Report 1877–78, 133 B

South Fork of Similkameen River.— (Four miles above Vermili Fork) Lignite. (Report 1877–78, p. 130 B.)

South Fork of Similkameen River.— (Quarter of a mile above Ve milion Fork, south bank.) Lignite or lignite-coal of good qualit which has been worked lately to a small extent for local use. Whe opened, shews an upper seam nine feet thick, with a few small sha partings, below this, some feet of mixed lignite and shale, and then seam of clean lignite-coal four feet or more in thickness, the botto being below water-level.

Tulameen River.—(Three miles above Vermilion Fork) Lignite sev feet thick with one shaly parting of three inches. (Report 1877–7 p. 132 B.)

Rock Creek.—(Half a mile from mouth on Kettle River.) Lignit thickness not known.

Kamloops.— (Three miles south-west of town.) Good coal in ba of Tertiary rocks, but so far thin seams only found. See p. 96 (Summary Report, 1888, p. 5.)

Crow Nest Pass.— Rocky Mountains. Bituminous coal, near Mart Creek. See pp. 93 R, 97 R. (Report 1886, p. 69 B., 1887, p. 12 T.)

North Kootanie Pass.— Rocky Mountains. Coal in thin seams western slope of "West Summit." The coal actually observed here not of workable thickness, but the measures are the same with tho of Marten Creek, and it is highly probable that important coal-sea may be found here. This is the nearest part of the "Elk River C taceous Trough" to the Kootanie valley, from which it is only twel

niles distant by the valley of the Wigwam River. (Report 1885, p. 4 B.)

Fording River.— A tributary of Elk River, Rocky Mountains. Coal n several thin seams, the thickest seen in small natural exposures eing two feet. (Report 1885, p. 109 B.)

Green Hills.— Elk River valley, Rocky Mountains. Near the summit of these hills, about four miles south of the last locality, a coal eam several feet in thickness, poorly exposed.

The above three localities, with that of Marten Creek, are all situated n the Elk River Cretaceous Trough, on the western water-shed of the Rocky Mountains. There can be little doubt that there is here an mportant coal-field. Other Cretaceous areas in the Rocky Mountains eing to the east of the water-shed are not included in the province of British Columbia. (See Report 1885, with accompanying map.)

Kootanie Valley near Bull River.—Lignite. So far found only in oose pieces. (Report 1885, p. 151 B.)

North Thompson River.— (Forty-five miles above Kamloops.) Bituminous coal of good quality in thin seams. (Report 1877–78, p. 113 B.)

Fraser River.—(East side, a short distance above the cantilever ridge.) Lignite. Thin seams.

Nicoamen, Thompson River.— Lignite. Seams so far found thin and impure.

Hat Creek, near Marble Cañon.— Lignite forty feet thick. (Report 1877-78, p. 140 B.)

Fraser River.— Between Soda Creek and Fort George, and at Quesnel. Lignite seams frequently exposed. That at Quesnel of poor quality. See p. 97 R. (Report 1875-76, p. 257.)

Lower Nechacco River.— (East of Fraser Lake.) Extensive Tertiary formation, but drift-lignite only known. (Report 1876-77, p. 82.)

Upper Nechacco River.— (South of Fraser Lake.) Lignites seen in several places about eight miles south of the lake. Thickest bed four feet. (Report 1876-77, p. 82.)

Blackwater River.— Drift lignites at Upper and Lower Cañons and along intervening portion of river. (Report 1875–76, p. 256.)

Chilacco River.— Drift lignite only found.

Nazco River.— Drift lignite found near Cinderella Mountain. (Report 1875–76, p. 254.)

Ko-has-gan-ko Stream.— South-west of Tanyabunkut Lake. Lignite of good quality, four feet or more in thickness. (Report 1876–77, p. 76; 1877-78, p. 48 G.)

Boyd's, or *Cold Spring Home.*—Lightning Creek, Cariboo. Lignite bed, 6 to 10 feet thick, and of fair quality.

Bear River.—(Near crossing of old C. P. Ry. surveyed line, lat. 54°). Coal reported and said to be about eighteen inches thick.

Parsnip River.—Lignite in place, and abundant in loose pieces (Report 1875-76, p. 71.)

Kitseguecla, Skeena River.—Impure coal observed in Cretaceous rocks (Report 1879-80, p. 103 B.)

Babine Portage, near Babine Lake.—Impure coal, observed. (Repor 1879-80, p. 104 B.)

Upper Skeena.—Two localities, 9 and 20 miles respectively above Skeena Forks. Impure coals, like the two preceding. (Report 1879-80 p. 105 B.)

Watsonkwa River.—(Eighteen miles above Skeena Forks.) Bituminous coal, reported to occur in quantity. Noted on p. 93 R. (Report 1879-80, p. 105 B.)

Pine River Cañon.—(Five miles above Lower Forks). Peace River district. Bituminous coal in four thin seams, the thickest being 2 feet. (Report 1875-76, p. 53.)

Coal Brook.—East Branch of Pine River. Peace River district. Coal in several thin seams. (Report 1879-80, p. 117 B.)

Cañon of the Mountain of Rocks.—Peace River. Bituminous coal in thin seams, of which the thickest observed is 2 feet. (Report 1879-80, p. 119 B.)

Tahl-tan River.—Cassiar district. Lignite reported to occur in Tertiary rocks.

Rapid River, Cassiar.—Lignite-coal about two feet thick reported near mouth.

Dease River.—(Eight miles above mouth.) Cassiar district. Lignite in thin beds. (Report 1887, page 95 B.)

Liard and *Frances Rivers.*—(Below and above their confluence.) Yukon district. Lignite. Thickest observed bed 3 feet. (Report 1887, p. 111 B.)

Chilkat Pass.—(Near the head of Chilkat River, 40 or 50 miles north-west of head of Chilkat Inlet.) Bituminous coal, which, in specimens examined, seems to be of good quality. Reported to occur in quantity in an area of sandstones, shales, etc., which runs in a north-westerly direction.

Lewes River.—(Lat. 62° 15′, long. 136° 25′.) Yukon district. Lignite coal. Several seams, but none observed of great thickness. (Report 1887, p. 148 B.)

Pelly, or *Yukon River.*—At Coal Creek, five miles below Forty-mile Creek, on east side of river. Two seams of coal or lignite-coal, reported by W. Ogilvie, of 5 and 7 feet in thickness respectively.

Iron.

South-west Shore, Texada Island.—Magnetite. Described on p. 99 R. Report 1886, p. 36 B.)

North-east Shore, Texada Island.—Magnetite. Irregular masses in mestone, with a more or less stratiform aspect. Thickest mass seen, feet. (Report 1886, p. 39 B.)

Island in the Walker Group.—Magnetite of exceptionally rich quality. This occurs on a small rocky inlet near the north end of the Walker Group, in Queen Charlotte Sound. The deposit has not been examined. Report 1872-73, p. 82.)

Rivers Inlet.—About 25 miles up the inlet on the north side. Magetite, resembling the Texada ore. Deposit said to be extensive.

Entrance of Rivers Inlet.—West side of Fitzhugh Sound. Magnetic ron ore reported. (Report 1873-74, p. 101.)

Harriet Harbour, Queen Charlotte Islands.—Magnetite. Noted on). 101 R. (Report 1878-79, p. 54 B.)

North side Skincuttle Inlet, Queen Charlotte Islands.—Magnetite. Report 1878-79, p. 53 B.)

Cape Commerell.—North end of Vancouver Island. Magnetic iron ands along the shores, but scarcely in sufficient quantity to be of economic importance. (Report 1886, p. 77 B.)

Knight Inlet.—One mile up river, at head of inlet, on left bank, 1200 eet up mountain. Magnetite reported. (Report 1873-74, p. 100.)

Opposite Seymour Narrows.—About six miles inland from Menzie's Bay. Iron ore. Reported to be a considerable deposit. (Report 1873-74, p. 101.)

Skidegate Inlet, Queen Charlotte Islands.—Clay ironstone in numerous and large nodules in several places in the coal-bearing rocks.

Baynes Sound Mine, Comox.—Clay ironstones in considerable quantity in association with the coal seams. Two specimens, examined by Mr. Hoffmann, gave 36·83 and 29·78 per cent. respectively of metallic iron.

Alberni Canal.—Magnetite. About a mile below China or Atlat Creek. Considerable veins traversing the rock on the shore.

Sooke.—(East side of harbour). Magnetite. Noticed on page 100 R. (Report, 1886, p. 17 T.)

Sooke.—(near the last). Hæmatite. Seen in exposure on the beach, but deposit apparently not extensive.

Near Hope.—A good specimen of magnetite. Reported as occurring about ten miles from Hope.

Near Nicoamen.—Ravine at the mill, about half a mile below Nicoamen. Vein or irregular deposit of magnetite with iron pyrites. The latter in such large quantity as to render the ore valueless.

Loadstone Mountain.—Near old "Brigade Trail," from Tulameen River to Hope, nine miles south-west of mouth of Otter River. Magnetite in numerous veins, traversing an intrusive mass of diorite. Veins actually observed, near the summit of the mountain, about six inches in thickness.

Iron Mountain.—On Nicola, near mouth of Coldwater River. Specular iron-ore in numerous small veins. Veins several feet in width reported but not actually observed. (Report, 1877-78, p. 122 B.)

Similkameen Valley.—(Three miles above Keremeoos, north side.) Schistose hæmatite found. (Report, 1877-78 p. 86 B.)

Bull River Cañon.—Kootanie Valley. Massive hæmatite, occasionally coloured with copper carbonate. Found loose in considerable quantity. (Report, 1885, p. 151 B.)

Cherry Bluff, Kamloops Lake.—Magnetite, in numerous, irregular veins traversing a greenstone mass. Some veins observed as much as three feet in thickness. The ore is of excellent quality. Specimens were found to contain 66·83 per cent. of metallic iron, with very little sulphur or phosphorus. (Report, 1877-78 p. 118 B.)

Watkinson's, Fraser River.—(about 23 miles above Lytton.) Magnetite. Vein said to be twenty feet in thickness,

Quesnel.—Clay ironstone in Tertiary rocks, often converted into hæmatite by the natural combustion of adjacent lignite-bed. Similar clay ironstones occur in many places in the Tertiary rocks of the Province in greater or less quantity.

COPPER.

(*See also Table of Assays of ores of the Precious Metals, pp.* 76 R *to* 79 R.)
Near head of Salmon Arm, Jarvis Inlet.—Deposit of bornite and copper-pyrites. (See p. 102 R.)

Knight's Inlet.—Ore similar to the last, very rich in hand specimens, locality not examined.

Entrance to Howe Sound.—(Three miles north of Atkinson Point Lighthouse) Copper pyrites found in 1865, and a considerable amount of prospecting work done at one time, but now abandoned.

Texada Island.—(Malaspina Mine.) Copper- and iron-pyrites in gangue of calcite and quartz. Accessory minerals, andradite, tremolite, chlorite and molybdenite. See p. 102 R. (Report 1886, p. 34 B.)

Sansome Narrows.—Copper-pyrites. Some prospecting work done a number of years ago, but now abandoned. The ore appears to follow cleavage-planes in the rock.

South-west side Dean Canal.—Specimens of vein-stone with yellow and purple copper ores, collected by Mr. Horetzky.

Head of Kitimat Inlet.—Small deposit of copper-pyrites and galena observed by Mr. Richardson.

Homathco River.—Entering head of Bute Inlet. Many specimens of tin-stones containing copper-pyrites and some purple ore, have been brought from this river, not examined.

Gnarled Islands,—North of Dundas Island, Dixon Entrance. Copper pyrites, small veins only seen.

Ellerslie Channel.—Near Milbank Sound. On the west shore of Nias Arm some work was done several years ago on a vein containing pyrrhotite or magnetic iron-pyrites and copper-pyrites. This deposit is known as the "Hebrew mine," and appears to deserve further examination as a copper-ore.

Port Simpson.—"Chimseyan Ledge". On the hill behind the village. Pyrrhotite with copper-pyrites in quartz gangue. A little prospecting work done.

Discovery Passage.—(Two miles and two-third south of Otter Point) quartz vein with copper pyrites, not large. (Report 1886, p. 44 B.)

North side of Skinkuttle Inlet, Queen Charlotte Islands.—"Old copper mine," copper pyrites in small quantity with magnetite. See p. 102 R. (Report 1878-79, p. 53 B.)

Copper Islands, Skinkuttle Inlet.—Small irregular strings and bunches of copper pyrites in many places. (Report 1878-79, p. 52 B.)

Copper Bay.—(Between Cumshawa and Skidegate, Queen Charlotte Islands.) Copper-ores occur here and some prospecting work done at the time. (Report 1878-79, p. 29 B.)

Small Island off Port Frederick, Queen Charlotte Islands.—Copper-ore reported by Captain Stuart, H. B. Co.

Coast two miles east of entrance to Sooke Harbour.—Copper-ore discovered 1864. Shaft sunk 120 feet, now abandoned. Native copper and copper-pyrites. See p. 102 R. (Report 1886, p. 19 T.)

South Similkameen River.—(East bank, six miles above mouth of Whip-saw Creek.) "British Columbia Copper Co's. Claim." Deposit consisting chiefly of copper-pyrites, said to assay $20 to the ton in silver, appears to be rather irregular. Prospecting work done in 1882-83. The same belt of rock with that containing the copper is said to have been traced in a north-westerly direction to Whip-saw Creek, and to shew more or less copper throughout.

Near head of Wolf Creek.—(About twelve miles above Vermilion Forks, Similkimeen.) Large body of copper ore reported to have been discovered by Mr. Jamieson, in 1888. Said also to contain silver. (Report of Minister of Mines of B.C., 1888, p. 318.)

Tulameen and *Similkameen Rivers.*—Native copper in small grains, and occasionally in pellets weighing several pennyweights, found in gold washings.

Between Rock and Boundary Creeks.—Deposit of grey copper o found in 1888. Reported to be extensive and several claims taken u on it.

Toad Mountain Region.—The silver-ores of this locality contain large percentage of copper. See p. 102 R.

Jubilee Mountain, Columbia River.—Though referred to on a previou page as deposits of the precious metals, composed largely of copp sulphurets. See p. 102 R.

Stump Lake Region.—Many of the ores found here, though chiefl valuable for the precious metals, contain a high percentage of coppe

Brisco Range, Rocky Mountains.—(Opposite lower end of Upp Columbia Lake.) Rich copper-ore consisting of chalcocite, bornit and copper-pyrites. Holds no gold or silver. (Report 1885, p. 27 M

Copper Island, Shuswap Lake.—Beds of talcose or nacreous schist about six feet thick, impregnated with a considerable quantity of coppe pyrites. (Report 1877-78, p. 98 B.)

Copper Creek, Kamloops Lake.—Irregular veins or impregnations copper-ore in trap rocks. Native copper is also reported to have bee obtained here by the Indians in former years. (Report 1877-7 p. 116 B.)

Cherry Bluff, Kamloops Lake.—Copper-ores with magnetite near th west end of the bluff. (Report 1877-78, p. 117 B.)

Watkinson's, Fraser River.—(About 25 miles above Lytton). Gre copper (tetrahedrite) in considerable mass.

Thompson River.—(Rock-slide about six miles above Spence's Bridg east bank). Copper-ores in irregular deposits, associated with brecci etc. Apparently unimportant.

Thompson River.—(Six miles below Spence's Bridge). Rich purp ore found loose.

Thompson River.—(Nine miles below Spence's Bridge). A roug fragment of native copper found here, weighing several ounces.

Fraser River, near Hope.—("Murphy's Mine.") Vein containin copper, rather wide and well defined. Said also to contain $15 to $4 in silver. A long tunnel run in 1859, and work resumed for a time i 1879.

Fraser River.—(About 30 miles above Fort George). Nugget native copper weighing several pounds, found loose.

Fraser River.—(Ten miles below Lillooet). Small lumps of nativ copper found in gold-placers.

Bate's, or 150-*mile house, Cariboo Waggon Road.*—Nugget of nativ copper, weighing about 15 pounds, found near here.

Vital Creek, Omenica.—Pellets of native copper found in gold wash ings.

Quesnel River, near The Forks.—More than half a ton of native copper, nuggets, obtained here during gold placer-mining. The precise cality appears to be "Twenty-mile Creek," which enters the river a tle below Morehead Creek.

Boulder Gulch, Thibert Creek, Cassiar.—Mass of native copper weigh- g about 15 pounds, found here. Also found in small nuggets in gold orkings on other streams in Cassiar district. (Report 1887, p. 82 B.)

NOTE.—As elsewhere stated, traces of copper ores and small irregular posits in veins and jointage-planes, or disseminated through rock- asses, have been observed in a great number of places, which it is ot considered necessary to enumerate here.

LEAD.

Most of the localities in which ores of lead are known to occur have ready been noted in connexion with silver-ores. See pp. 56 R *to* 75 R. *istricts or localities likely to yield a considerable proportion of lead in nnexion with silver-mining are, therefore, here merely mentioned. Refer- ce should be made in this connexion to the Table of Assays of Ores of the recious Metals, pp.* 76 R *to* 79 R.

Mount Stephen, or *Tunnel Mountain.*—Extensive deposits of galena, lding a large percentage of silver. (See p. 66 R.)

Illecillewaet Region.—Large deposits of galena, often rich in silver. ee p. 63 R.)

Hot Springs Camp, Kootanie Lake.—Large deposits of galena and arbonate ores,' often rich in silver. (See p. 61 R.)

Hendryx Camp, Kootanie Lake.—Extensive deposits of galena, con- ining a moderate amount of silver. (See p. 62 R.)

Rock Creek and Vicinity.—Galena ores, often containing a high per- ntage of silver. (See p. 68 R.)

Omenica Region.—Veins of galena abundant; generally rich in silver. See p. 73 R.)

Nass River.—Specimens of galena ore given to the late Mr. J. Rich- dson by Mr. W. Lyons. Precise locality was not stated, and the ecimens have not been tested for silver.

Lower Cañon, Upper Liard River.—Galena in irregular veins. Per- ntage of contained silver not known.

Chilcotin River.—Specimens of galena collected by Mr. Tiedemann. ercentage of contained silver not known.

Near Indian Village, Cumshewa, Queen Charlotte Islands.—Numerous mall veins in agglomerate, holding a little galena and iron pyrites. Report 1878-79, p. 77 B.)

Galena is also present in greater or less quantity in a number of th Cariboo mines, but does not appear to be so rich in silver as in th Selkirk region. Of veins in Cariboo in which galena occurs in notab quantity, the "*Home Rule Ledge*" near Barkerville, and the "*Holm Ledge*" on Break-neck Ridge, Snow-shoe Plateau may be mentioned.

Antimony.

Near Watkinson's, Fraser River.—About two miles below the iro ore locality already mentioned, and say 23 miles above Lytton Vein about 14 inches wide, containing much stibnite, with quart and calcite. Contains also traces of gold, and 2·187 ounces of silver t the ton. (Report 1887, p. 58 T.)

Cumshewa, Queen Charlotte Islands.—Specimens containing antimon and arsenic, probably from this place, obtained by Captain Stuar H. B. Co.

Platinum.

Upper Similkameen and *Tulameen Region.*—Platinum, often in nuggets observed in a number of localities where gold-mining is carried on (For the names of these places see p. 104 R.)

Tranquille River, Kamloops Lake.—Found in fine scales with gold (Report 1877-78, p. 155 B.)

Fraser River.—Mentioned as occurring in very fine scales, with gold particularly at a place ten miles below Lillooet.

Yukon River.—Found in small quantities, in fine scales, with river bar gold on all, or nearly all, the tributaries of the Yukon which have been worked.

Mercury.

Wapta (Kicking Horse) Valley, Rocky Mountains.—("Ebenezar Mine," three miles from Golden.) Bright red cinnabar disseminated in gangue of calcite. Deposit prospected to some extent, but not proved to be of economic importance. (Report 1886, pp. 41 D., 9 T.)

Homathco River.—Cinnabar found here during railway survey. Lode reported well defined and traceable for three-quarters of a mile. Country rock slate. The precise locality is, north side of Homathco River, nearly opposite station 3300, Cambie's Location Survey of 1875.

Fraser River.—Grains of cinnabar obtained in gold-washing near Boston Bar.

Fraser River, 12 miles above Kelly's Lake Creek.—Some way up a ream which flows in from the west, at this place, rich specimens of nnabar containing native mercury, found.

Vicinity of New Westminster.—A rich specimen of cinnabar, reported y Mr. A. J. Hill, to have been found loose here.

Silver Peak, near Hope.—Globules of native mercury seen in some arts of the silver-ore found at this place.

Molybdenum.

Near head-waters of South Fork Spuzzum Creek, Fraser River.—Iolybdenite in quartz veins. Fine specimens received.

Point east of Carrington Bay, Cortez Island, Strait of Georgia.—Iolybdenite in small quantities in quartz veins.

Texada Island.—Molybdenite at Malaspina copper mine, in the vein.

Near head of Salmon Arm, Jarvis Inlet.—Molybdenite in association vith copper-ore at the locality previously noted. (See p. 152 R.)

Knight Inlet.—Molybdenite reported.

Upper part of Cowichen River.—Specimens of molybdenite brought rom here.

Lillooet River.—Specimen of molybdenite received from this vicini-y per Mr. A. J. Hill.

Structural Materials.

Building Stones, etc.

(*Mention is here made merely of several localities in which stone has been quarried, and of some others which are so circumstanced as to appear to be of importance.*)

Nelson Island, Jarvis Inlet.—Pinkish-grey granite. Takes a good polish, and has been used in the construction of the dry-dock at Esquimault. Well situated for quarrying.

North Arm of Burrard Inlet.—Grey granite, easily quarried in blocks of any size, at the water's edge, and used in construction at Vancouver.

Admiralty or Salt Spring Island.—Greenish-grey sandstone of excellent quality. Easily quarried and shipped. Used in construction of dry-dock at Esquimault.

Pender Island.—Sandstone of good quality quarried to a limited extent. Known as "Browning Island stone."

Newcastle Island, Nanaimo.—Sandstones quarried here has been used in the construction of the mint in San Francisco, etc. (See p. 107 R.)

Near Nanaimo.—Sandstones from an extension of the measures a Newcastle Island. Quarry opened in 1875.

Chase River Quarry, near Nanaimo.—Sandstones similar to those abov noted.

Texada Island.—Grey, white and blotched marbles in unlimite quantity. These have been quarried to a small extent at Marble Cov on the north-east shore, three miles and a-half from the north point o the island. Useful for ordinary purposes of construction, and taking a good polish. (Report 1886, p. 34 B.)

Beaver Cove, north-east coast of Vancouver Island.—Half a mile up th stream, which enters at head of cove. Grey marbles, often handsomely variegated, have been quarried to a limited extent.

White Cliff Island.—(Between Chatham Sound and Grenville Channel. Marble, white, grey and pinkish. Attempt made to open a quarry in 1878.

Marbles occur in many other places at which no work has occurred, on or near the coast of British Columbia. Among these may be mentioned :—

Nimpkish Lake.—Grey and mottled marbles in great abundance.

Near Horne Lake, between Qualicum and Alberni.—According to Mr. J. Richardson, a great variety of ornamental marbles suitable for almost all purposes. (Report 1873-74, p. 101.)

The following eight localities are those noted in the course of a somewhat minute examination of the shores of the Strait of Georgia and Queen Charlotte Sound in 1885, as well adapted for the opening of quarries of building stone of good quality. None of them have yet been utilized :—

Near entrance to Squirrel Cove, Cortez Island.—(West side of entrance.) Pale greyish hornblendic granite. (Report 1886, p. 23 B.)

Walsh Cove, Redonda Island.—Pinkish-grey granite. (Report 1886, p. 24 B.)

Bay on south side of Hardy Island, near Jarvis Inlet.—(West end of island) Granite. (Report 1886, p. 31 B.)

Otter Cove, Discovery Passage.—Pinkish granite. (Report 1886, p. 45 B.)

Small Island opposite Chatham Point, to the north.—Granite like the last. (Report 1886, p. 47 B.)

West shore of Port Harvey, Johnston Strait.—Grey granite, also in several other places in this vicinity. (Report 1886, p. 50 B.)

Haddington Island, Broughton Strait.—Grey calcareous sandstone. An extensive quarry might be opened here with facility. (Report 1886, p. 57 B.)

Ledge Point, Port McNeill.—Near the last locality. Sandstone, but

rder and less favourably circumstanced for working than the last. eport 1886, p. 61 B.)

Of localities of building-stone in the interior of the Province it is ssible only to mention a few in the immediate vicinity of the line of ailway :—

Near Cantilever Bridge, Fraser River.—Excellent grey granite quar-ed here, for use in construction of piers.

North Bend, Fraser River.—Similar granite quarried here, to a nited extent. This and the foregoing place may be taken as repre-nting a large number of localities which might be utilized along this art of the Fraser.

South Side of Kamloops Lake.—Nearly opposite Tranquille, cliffs of afaceous sandstone and brown dolerite occur which might afford uilding-stone of fair quality.

South Thompson River.—(Seven miles below outlet of Little Shuswap ake.) Granite of fair quality comes out on the line of railway. Report 1877-78, p. 165 B.)

On the Shuswap Lakes abundance of moderately good building stones, granites and other cyrstalline rocks) occur, and stones which may be sed for construction are also found at intervals along the line of rail-ay eastward.

Lime and Cement.

Of limestones suitable for making lime, it is possible merely to mention few localities in which lime has been burnt, or which appear to be so situ-ted as to be of immediate importance.

Victoria.—Several beds of limestone occur here in metamorphic ocks, and a little lime has been made from them from time to time, ut the stone is to impure to afford a good lime.

Saanich.—Limestones affording excellent lime found in several places nd burnt for use in Victoria.

Texada Island.—The northern part of the island, already mentioned s a locality of marble, affords abundance of excellent material for the manufacture of lime, and is readily accessible, (see p. 109 R.)

Near Agassiz Station, C.P.Ry.—Limestone occurs here. Of specimens of three varieties examined in the laboratory of the Survey, two proved sufficiently pure to make good lime. (Report 1888, p. 56 T.)

Near Popcum, Lower Fraser River.—Limestone, apparently of good quality, in a stream on north side of Cheam Mountain, situated about half a mile from the Fraser. Reported by Mr. A. Bowman.

Near Hope Station, C.P.Ry.—Limestone has been burnt here to a limited extent, at a place near Murphy's mine, about one mile above

Hope Station, and the same distance back from the railway. Lim has also been made about four miles above Hope, on the east side the river, but was said to be impure.

About six miles above Yale.—Limestone or marble which has bee burnt, but most of which is too siliceous to afford a good lime,

Near Forty-mile Post, Waggon Road, Fraser River.—Grey laminate limestone, about 100 feet thick and apparently of good quality. (Re port 1877-78, p. 163 B.)

About seven miles above Spence's Bridge.—Limestone of good qualit appears on the line of railway and also on the opposite side of th river, where it continues for several miles. (Report 1877-78, p. 163 B.

North Thompson, six miles and a-half above Kamloops.—(East side o river.) Good limestone.

North Thompson, seventeen miles above Kamloops.—(West side of river near Venn's.) Here and at several places a few miles further up, abun dance of good limestone for burning.

South Thompson, ten miles above Kamloops.—(North bank.) Extensiv exposures of good limestone. (Report, 1877-78, p. 80 B.) This and th two preceding localities are in communication by water with Kamloops, etc.

Shuswap Lakes.—Limestone suitable for burning in numerous places along the shores. (For details, see Report, 1877-78, p. 163 B.)

Qaulchena, Nicola Lake.—(near mouth of McDonald River.) Good limestone, which has occasionally been used for the manufacture of small quantities of lime.

Near Stump Lake.—(a mile and a-half south from 'Palmer's,' on the hill.) Good limestone outcrops here, and may possess importance from its proximity to the Stump Lake mines.

For other occurrences of limestone in the southern interior of the Province, See Report, 1877-78. Limestones occur in great abundance and of good quality in that part of the Rocky Mountain range which is traversed by the railway. (Consult Reports, 1885. Part B., 1886, Part D.)

Near Skidgate, Queen Charlotte Islands.—Volcanic tuff resembling 'trass,' which may probably afford the basis of a hydraulic cement. (See p. 109 R.)

Ornamental and Precious Stones.

The marbles included in the above enumeration, might be mentioned under the head of Ornamental Stones. For remarks on other materials see p. 108 R. *Such localities as might be noticed under Precious Stones are mentioned on pp.* 110 R, 111 R, *and need not here be repeated.*

Miscellaneous Minerals.

Arsenic.—Native arsenic in considerable mass in veins seven miles up Watson Creek, west side of Fraser River, 25 miles above Lytton. (Report, 1886, p. 86 T.)

Bismuth.—In long prismatic crystals of the sulphide, in quartz. Little Shuswap Lake, north side, a mile and three-quarters from head of lake. (Report 1877-78, p. 162 B.)

Iron-pyrites.—Specimen of massive pyrites, said to occur in large quantity, brought from Copper Island, Barclay Sound.

Plumbago.—Large deposit of disseminated plumbago at Alkow Harbour, Dean Canal.

Plumbago.—Specimens obtained by the Vancouver Island Exploring Expedition in the country north-east of Port San Juan.

Nickel.—Nickeliferous sand obtained in gold-washings on the Fraser River, consists of magnetite, and pyritous grains attracted by the magnet, which consist of oxides of iron and nickel. (J. Blake, M.D., Proc. Cal. Acad. Sci., V. p. 200.)

Asbestus.—Thibert Creek, Cassiar. Specimens of a rather coarse and brittle variety of serpentine-asbestus.

Asbestus.—Stewart River, Yukon district. Small specimen of good serpentine-asbestus obtained. (Report, 1887, p. 27 B.)

Mica.—At a place about 120 miles north-east of Clinton, a large deposit of mica is said to occur. Specimens of good size have been brought out, but having been obtained from the surface, are somewhat weathered.

Mica.—In large crystals in veins traversing granites near the extremity of the north-east arm of Shuswap Lake, and may prove to occur of useful dimensions here or elsewhere in the same mountain region. (Report, 1877-78, p. 162 B.)

Nitre.—Filling cavities in a cavernous calcareous tufa on the Nazco River. (Report, 1875-76, p. 265.)

Nitre.—Specimens received from Big Bar, Fraser River, where it probably occurs under circumstances similar to the last.

Bitumen.—Oozing out on the beach. Tar Islands, Queen Charlotte group. (Report, 1878-79, p. 60 B.)

Amber.—A rounded fragment found in possession of the Indians, and said to be derived from the west coast of the Queen Charlotte Islands. (Report, 1878-79, p. 85 B.)

Mineral and Thermal Springs.

Nanaimo.—Salt spring. Issues from the Cretaceous coal-bearing strata near the Douglas seam, and according to Mr. Richardson, has a flow of two to three gallons a minute. The Hudson Bay Company at one time attempted the manufacture of salt here, but it was soon abandoned. The brine has been analyzed by Mr. Hoffmann, who found it to contain 52·154 parts of saline matter in 1000. Of this thirty-nine parts were common salt and the remainder largely calcium chloride. According to an analysis quoted by Pemberton, it contained 49 parts of salt in 1000 in 1854. (Report 1872-73, p. 82. Facts and Figures relating to Vancouver Island, etc., p. 159.)

Admiralty Island.—Salt spring. According to analysis quoted by Pemberton in the place above cited, the spring contains 65 parts of saline matter to 1000, but with more impurities than the last.

Harrison Lake.—Hot springs, known as "St. Alice's Well." According to Dr. Selwyn there are two principal springs, with temperatures of 120° to 150° F. respectively, and both copious. The water has been analysed in the laboratory of the Survey and the results will appear in the annual report for 1888.

Near Lillooet River—About five miles from head of Harrison Lake Hot Spring, known as "St. Agnes' Well," no particulars.

Near Upper Columbia Lake.—Hot spring. At about two miles below the lower end of the lake, on a hill on the east side of the valley. Estimated to yield about twenty gallons a minute, at a temperature of 112° F. The outflow produces a calcareous deposit. A qualitative analysis has been made by Mr. E. B. Kenrick. (Reports 1885, p. 154 B., 1886, p. 15 T.)

Sinclair Pass.—Rocky Mountains. Hot springs, on south side of Berland's Brook, near the point at which it issues from the mountains into theUpper Columbia valley. Three springs reported, and said to be copious. Mr. John McKay, who discovered these springs, states the temperature of one as 108° F., of another as 118° F.

Elk River Valley.—Rocky Mountains, about Lat. 50° 7′, warm sulphur-spring reported on east side of river by Mr. H. M. Hatfeild.

Kootanie Lake.—Hot springs, giving its name to the "Hot Springs Mining Camp." Situated on west side of lake, directly opposite the "Blue Bell Claim." Several springs occur near the edge of the lake and some below the water-level. Temperature estimated at about 100° F.

Upper Arrow Lake.—Hot spring. On the east side of the lake, twelve miles from its head, and one hundred and fifty yards from the lake. Said to be about as hot as can comfortably be borne in bathing.

Albert Cañon Station C. P. Ry.—Hot spring. About a mile to the rth of the Station. Temperature about the same as the last.

Near Upper Arrow Lake.—Hot spring reported by Indians at some tance back from the lake, on the flat land at the west side of the e, three or four miles from its southern end.

Near Albert Cañon Station.—'Soda spring.' One mile and a half st of the station on south side of the track. This and the following rings are known as 'soda springs' in consequence of the presence large quantities of carbonic acid gas.

Near Carne's Creek.—On west side of Columbia River and opposite mouth of Carne's Creek. Group of springs with copious escape of rbonic acid gas.

Near Downie Creek.—'Soda spring.' Is situated about three-fourths a mile north-west of the trail from Downie to Gold Creek and about ur miles from the latter.

Four miles above Smith's Creek.—West side of Columbia River. rings with considerable escape of carbonic acid gas, and deposition of n-oxide, reported.

Skeena River.—Left bank, about fourteen miles above "Inverness nnery." Hot spring No particulars.

Stikine River.—Hot spring. Situated a short distance above Buck's r and directly opposite the Great Glacier. No particulars.

Kennicot Lake.—At head of south branch of Taku River. Hot spring. id to feed the lake. (Alaska and its Resources. Dall. p. 628.)

Hot Spring Island.—Queen Charlotte Islands. Hot springs with a ght smell of sulphureted hydrogen and a barely perceptible saline ste. Temperature over 100° F. (Report 1878-79 p. 22 B.)

Vermilion River.—Vermilion Pass, Rocky Mountains. About six iles west of the summit, on the north side of the valley, copious alybeate springs, depositing ochre, from which the name of the pass derived. (Report 1885, p. 120 B.)

Maiden Creek.—"Dougherty's spring." South of Clinton, and about ree miles up the stream from the waggon-road crossing. Mineral ring, highly charged with carbonic acid, which escapes in such large antity as to prove fatal to small birds approaching the spring. A alitative analysis by Mr. Kenrick. (Report 1886, p. 13 T.)

McDonald's 'Oil Spring.'—Head-waters of Omenica River, lat. 56°. his spring is marked as above on Trutch's map of British Columbia. is not, however, an oil spring, but is described as a small mound in e centre of which a hollow exists charged with carbonic acid to such extent as to prove fatal to birds and small mammals.

Spallumsheen Arm.—Shuswap Lake. A spring known to the Indians Pilpilpoopil, issues near shore of lake. Gas or air escapes with the ater in considerable quantity. (Report 1877-78, p. 25 B.)